# Railroad Age Gazette

**Including the Railroad Gazette and The Railway Age**

PUBLISHED EVERY FRIDAY BY
THE RAILROAD GAZETTE (INC.), 83 FULTON STREET, NEW YORK.

CHICAGO: 160 Harrison St. PITTSBURGH: Farmers' Bank Bldg.
LONDON: Queen Anne's Chambers, Westminster

W. H. BOARDMAN, *President and Editor.*
E. A. SIMMONS, *Vice-President.* RAY MORRIS, *Sec'y and Man'g Editor.*
R. S. CHISOLM, *Treasurer.*
**The address of the company is the address of the officers**

Subscription, including regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free.

| | |
|---|---|
| **United States and Mexico** | **$5.00 a year** |
| **Canada** | **$6.00 a year** |
| **Foreign Edition, London** | **£1 12s ($8.00) a year** |
| **Single Copies** | **15 cts. each** |

Entered at the Post Office at New York as mail matter of the second class.

VOL. XLV., No. 12. FRIDAY, AUGUST 21, 1908.


## CONTENTS



About two years ago* we published a series of articles giving the unit cost per mile of a number of representative roads. The figures were those of actual cost of construction of complete permanent way only, omitting the cost of land, buildings, signals, rolling stock, etc., which vary with the character of the towns and cities served rather than with the physical character of the country. The purpose is to tell about what it costs to build a road of a given type in a given section of the country. In resuming this series, we are gathering data only on railroad built within the last two or three years. The figures will thus show unit costs of construction as carried out with present-day methods and equipment, and also the reader will have in mind recent prices of labor and material clearly enough to judge of the proportion of the cost. All the roads taken up in previous articles were in the more thickly populated sections of the country, or at least were in close touch with the sources of materials and supplies. The cost of the Alaska Central, which is given on another page of this issue, is high, as is to be expected in new country, to which construction plant, supplies and much of the material must be brought from distant producing points and the cost of labor is correspondingly great.

*September 7, 1906, p. 189 and p. 203; October 26, 1906, p. 372; November 16, 1906, p. 43; November 23, 1906, p. 462.

The rapid work made possible by high-speed steel and quick-acting machine tools has already reached a point on some classes of material where the limiting factor is not the workman or the machine or the tool steel, but the means by which the material is delivered to and removed from the machine. Several interesting examples of this condition were given in the discussion of L. R. Pomeroy's paper on "The Possibilities of High-Speed Tool Steel," at a recent meeting of the Central Railway Club. A high-speed drill press of special design on a recent test drove a drill 1⅛ in. diameter through cast iron at the rate of 29 inches per minute. The feed was $^1/_{15}$ in. per revolution, and the speed 450 r.p.m. Assuming that the machine would drill steel plates at half this speed, it will be found that the performance exceeds that of a punching machine making holes in a $^7/_{16}$-in. plate and running at the rate of 30 strokes per minute. A cutting-off machine has recently been developed which cuts through a bar of steel 6 in. in diameter in 1½ minutes, and such a machine could not be worked to capacity unless the existing means of clamping the bars and handling them to and from the machine were greatly improved. A familiar example illustrating the same principle in locomotive machine shops is the rapid work performed by high-speed steel on driving wheel lathes, when eight or ten pairs of 56-in. tires are turned per day, and a gang of helpers is required to put in the wheels, tighten the dogs and roll away the turned wheels, while the machinist is kept busy tightening, loosening and changing tools. These various limitations, relating to handling rather than cutting, have resulted in a radical change in the design of the driving wheel lathe which materially lessens the labor of the operators. The new lathe is provided with turret tool-posts which permit the roughing, flanging and finishing tools to be successively presented to the tire in only a fraction of the time and effort required by the old form of tool-post having four nuts which are required to be tightened and loosened. The lathe is also provided with hinged dogs which permit of much more rapid adjustment than those now in general use. This improved driving wheel lathe was illustrated in the *Railroad Age Gazette*, June 5.

The returns of 68 railroads for the fall fiscal year 1908 show that taxes represented considerably more than 3.2 per cent. of gross revenue as compared with about 3.1 per cent. of the gross revenue of the roads reporting to the Interstate Commerce Commission in the year 1907. Stated a little differently and more clearly, the returns for about 50 per cent. of the gross receipts of the railroads of the country indicate an increase of taxation for 1908 of about 4 per cent. This does not look large upon its face. But it contrasts with a period of five years during which taxes in their ratio to gross earnings remained almost stationary; some roads assessed upon market value of stocks during the depression have undoubtedly profited by it in the matter of taxes, and what is more ominous, now that the raise of taxation has begun, the taxes in a large number of cases have undoubtedly rested on assessments made in 1907, and then, to a large extent, antedated the period of anti-railroad legislation in which new taxes have figured. The full results will hardly appear, therefore, until the close of the fiscal year, 1909, when we shall know better than now how hard the new tax laws have hit railroad interests. Taxation is not a factor in railroad finance that measures up to the size of some others. But its inexorable quality as a charge, its vicious charm for legislators and, above all, its fixed character of almost never going backwards, give it a seriousness out of proportion to its size. It has been said with truth that about every form of taxation known to man has been applied to the American railroad, and that truth is not

far from the present fact. There is a most imperative call for unifying and reducing to equity our present myriad and hybrid laws of railroad taxation in the 46 states, and, incidentally, eradicating the outrageous system under which the railroad security holder finds himself taxed upon it in one state, while his road, built from the proceeds of that security, is taxed up to its full capitalization and debt in another state. Why double taxation so palpable and so unjust yet remains so persistent is one of the economic enigmas. Its redress by helping the stockholder would, obviously, to that extent help the roads.

Problems in train dispatching never lose their interest, and all three of the gentlemen whose attention we directed recently to a puzzle question about three or four unusually wild trains have sent on their solutions. The third one, that of Mr. Forman, is printed in this issue.* The trains not only were wild, but, ostensibly, were determined to be still more wild; to twist and stretch the rules in any manner possible. This, however, does not discourage our energetic dispatchers, and they promptly jump into the fray. And they jump all over the trainmen who, in the supposed case, juggled with the rules. We are glad to have these contributions to our columns, for the dispatchers are among our most useful railroad men; not only because they manage the trains, but because they frequently make the rest of us sit up and take notice, when, without such stimulus, we should be dull and sleepy. But we must again remind our correspondents that we cannot agree to their underlying theory. They believe in simplifying the rules until perfect simplicity shall have been reached. We grant that they may succeed in this endeavor, but the victory will turn to ashes in their mouths. If the rules are made perfectly lucid they will be so long that half the conductors and enginemen will "lay down" before mastering them. And when the dispatchers shall have agreed upon satisfactory rules the superintendents will step in and demand that some new complication in train movement shall be provided for. Mr. Forman not only sees the handwriting on the wall, but has the courage to acknowledge the fact. Putting a fine quality of brains in the dispatcher's office while continuing to employ the ordinary grades on engines and in cabooses, calls to mind the surveyor who, in measuring distances on the ground, was satisfied with pacing—using at all times, we hope, the same pair of legs and the same heart and lung power—but who went into the office at night and took great care to carry all his computations out to six decimals! We do not mean that we wish to dispense with any of the brains in the dispatchers' offices; we desire to see them put to better uses. The most progressive and useful dispatcher is that one who, while devoting close attention to doing the most perfect work at his desk day by day, takes good care also to see that his superintendent realizes the impossibility of securing a satisfactory degree of perfection in the working of the dispatching *system*. In telling the superintendent how skilfully the dispatching has been done, and how a high degree of vigilance and ingenuity in the office has prevented conductors and enginemen from causing collisions, a dispatcher is, indeed, saying a good word for himself; but if he wishes to say a good word for the company, the public and the trainmen let him rather impress on the superior officer the numerous instances where collisions are averted only by good luck; and where trainmen and operators make mistakes against which no amount of vigilance in the dispatcher's office has yet proved a satisfactory safeguard.

The recent abolition of the office of special examiner on the Chicago & Alton invites consideration of a practice which has been followed on that road for a number of years and which has been carried out so thoroughly that excellent results have been obtained, as the record of the Alton in handling the traffic of the St. Louis World's Fair bears testimony. We have preached the gospel of examination and re-examination of train and station employees for many years, and as the Alton has consistentiy followed that idea with success it seems worth while to review the practice in relation to this important and far-reaching question. The Alton formerly employed a special examiner who was furnished a special car fitted with living accommodations and apparatus for visual, color perception and hearing tests, and with a stereopticon by means of which the entire signal and station layout of the railroad could be shown by a series of transparent photographic views, properly colored and thrown on a screen. By means of this apparatus the examiner was able to take an employee—a fireman for promotion to the position of engineer for instance—to each signal, interlocking plant, junction or yard layout, as seen from the cab of an approaching locomotive and examine him in a practical manner and give him such instruction as the special circumstances surrounding each layout might require. In the matter of train rules and special instructions the examination was precise and recorded. As it was made by one man it had the added advantage of being the same in each case, so that all the men were instructed, and nearly the same language was used in every instance. The importance of having the train and signal rules and the general practice interpreted in the same manner by all the employees interested cannot be gainsaid, and it should not be overlooked. As a substitute for the precision herein outlined, it is proposed that a general meeting shall be held (*Railroad Age Gazette*, July 31, p. 616), at which meeting the practice and rules are to be discussed. Apparently no provision has been made for the examination of men entering the service or for promotion. This cannot be regarded otherwise than a step backward, since it is of the first importance to know positively that the employee knows the rule, can interpret it correctly, and fully understands its application. After examination has determined that he has such knowledge and the employee has had some experience in his duties, he may perhaps profitably be brought into a general meeting composed of the "division superintendent and his staff officer, supplemented by representatives of the traffic department." Until that time, at least, the mere discussion of some of the rules and practices cannot be sufficient.

*See also June 26, page 369; July 24, page 561; July 31, page 611; August 7, page 655.

## SOME EFFECTS OF RAILROAD IMPROVEMENTS.

For more than 30 years, American railroad managers have had as one of their chief objects the introduction and adoption of appliances and methods of operation which would enable them to increase the work—the amount of transportation—in proportion to the force of men and the road and machinery. For the earlier part of this period statistics of the whole railroad system are too imperfect to enable us to determine precisely the result. Reports of such great systems as the Pennsylvania, the Chicago, Burlington & Quincy and the Chicago & North-Western show what separately they had accomplished after the panic of 1873: but it was not till the national statistics were reported on a uniform basis to the Interstate Commerce Commission that we had a basis for tracing the general progress. Beginning with the year ending with June, 1889, we have fairly complete and uniform statistics for the whole country. From that year to 1907, the railroad mileage increased from 156,404 to 229,951, or more than 40 per cent., but for our present purposes this is of little importance: we shall try to trace the changes in the capacity of the railroads, as shown by traffic per mile, and the amount of increased efficiency per man engaged in railroad work, following the improved tracks, more powerful locomotives and cars of larger capacity.

In the year to June 30, 1889, the traffic of the railroads averaged 448,069 ton-miles, and 75,325 passenger-miles per mile of railroad—easier of realization, equivalent to 618 tons and 103 passengers each way daily over the whole system. This density of traffic increased, but moderately, until after 1897, meanwhile reaching its maximum in 1892-93, when freight

traffic was 23 per cent., and passenger traffic 11¼ per cent. greater than in 1889. That is, railroad mileage had increased nearly as fast as traffic. The number of employees per mile had increased from 4.59 to 5.15, or 12 per cent., and the amount of traffic *per employee* (and to this we call attention particularly), 97,619 ton-miles and 16,441 passenger-miles in 1889, had increased only to 107,035 ton-miles and 16,274 passenger-miles in 1893. Gross and net earnings per mile of road had increased about one-eighth, but *per employee* they had been almost stationary. The net per employee was $455 in 1889 and $449 in 1893.

EARNINGS AND TRAFFIC PER MILE OF ROAD AND PER EMPLOYEE.
*United States Railroads.*

| June 30: | No. of employees per 100 miles. | Per mile of road — Ton-miles. | Pass.-miles. | Gross earn. | Net earn. | Per employee — Ton-miles. | Pass.-miles. | Gross earn. | Net earn. |
|---|---|---|---|---|---|---|---|---|---|
| 1889 | 459 | 448,069 | 75,325 | $6,290 | $2,087 | 97,619 | 16,411 | $1,371 | $455 |
| 1890 | 479 | 487,245 | 75,751 | 6,725 | 2,300 | 101,721 | 15,814 | 1,404 | 480 |
| 1891 | 486 | 502,705 | 79,642 | 6,800 | 2,262 | 103,437 | 16,387 | 1,400 | 465 |
| 1892 | 506 | 543,365 | 82,285 | 7,213 | 2,404 | 107,384 | 16,262 | 1,425 | 475 |
| 1893 | 515 | 551,232 | 83,809 | 7,190 | 2,314 | 107,035 | 16,274 | 1,396 | 449 |
| 1894 | 444 | 457,452 | 81,333 | 6,109 | 1,946 | 103,030 | 18,318 | 1,376 | 438 |
| 1895 | 441 | 479,490 | 68,572 | 6,050 | 1,967 | 108,637 | 15,549 | 1,372 | 446 |
| 1896 | 454 | 523,832 | 71,705 | 6,320 | 2,072 | 115,381 | 15,804 | 1,392 | 455 |
| 1897 | 449 | 519,079 | 66,874 | 6,122 | 2,016 | 115,608 | 14,893 | 1,363 | 450 |
| 1898 | 474 | 617,810 | 72,462 | 6,755 | 2,325 | 130,340 | 15,287 | 1,425 | 491 |
| 1899 | 495 | 659,565 | 77,821 | 7,005 | 2,435 | 133,245 | 15,721 | 1,415 | 492 |
| 1900 | 529 | 735,352 | 83,290 | 7,722 | 2,729 | 139,008 | 15,745 | 1,465 | 516 |
| 1901 | 548 | 760,414 | 89,721 | 8,123 | 2,854 | 138,761 | 16,372 | 1,482 | 521 |
| 1902 | 594 | 793,351 | 99,314 | 8,625 | 3,048 | 133,561 | 16,700 | 1,452 | 513 |
| 1903 | 639 | 855,442 | 103,291 | 9,258 | 3,133 | 133,872 | 16,164 | 1,448 | 490 |
| 1904 | 611 | 829,476 | 104,198 | 9,306 | 2,998 | 135,757 | 17,054 | 1,523 | 491 |
| 1905 | 637 | 861,396 | 109,949 | 9,598 | 3,189 | 135,227 | 17,259 | 1,507 | 501 |
| 1906 | 689 | 982,401 | 114,529 | 10,460 | 3,548 | 142,584 | 16,621 | 1,518 | 511 |
| 1907 | 735 | 1,028,700 | 120,516 | 11,383 | 3,696 | 139,960 | 16,397 | 1,549 | 503 |

The panic of 1893 (affecting the business of the year to June 30, 1894) resulted in a decrease of 17 per cent. in freight traffic per mile, but very little decrease in passenger traffic nearly the whole of the Chicago World's Fair travel falling in that year (after June, 1893). It also resulted in a decrease of no less than 14 per cent. in the number of employees, who turned out quite as much traffic per man as the year before—less freight, but more passengers. Not till after 1897 did the density of freight traffic equal that of 1893, while passenger traffic was lighter until after 1900—this was when the trolley invasions were most felt. Neither did the force of employees per mile of road reach the figures of 1893, until 1900. But this was just when the traffic per employee increased most. In separate years this traffic per man was:

| | 1889. | 1893. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. |
|---|---|---|---|---|---|---|---|---|
| Ton-miles | 97,619 | 107,035 | 108,637 | 115,381 | 115,608 | 130,340 | 133,245 | 139,008 |
| Passenger-miles | 16,411 | 16,274 | 15,549 | 15,804 | 14,893 | 15,287 | 15,721 | 15,745 |

The two kinds of traffic must be taken together, of course, to measure the performance per man; but the passenger traffic is seen to have fluctuated comparatively little. On the other hand, the freight movement per man, which in the six years from 1889 to 1895 increased but 10¼ per cent., from 1895 increased 6 per cent. in 1896, 20 per cent. in 1898, and 28 per cent. in 1900, with substantially no change in passenger traffic.

But here this course is arrested. Only twice since 1900 have the railroads carried as much freight traffic per employee as in that year, the figures being:

| | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. |
|---|---|---|---|---|---|---|---|
| Ton-miles | 138,761 | 133,561 | 133,872 | 135,757 | 135,227 | 142,584 | 139,960 |
| Passenger-miles | 16,372 | 16,700 | 16,164 | 17,054 | 17,259 | 16,621 | 16,397 |

The increase in passenger traffic makes much greater demands on the working staff than the freight, but altogether it seems that the amount of traffic handled per man has been comparatively stationary. The total traffic increased tremendously in this period, but so did the number of employees.

The effect on the capacity of the railroads of the improvements, chiefly intended to make larger train-loads possible, cannot be traced so closely. We have only the actual amount of traffic per mile of road, and an economy can be effected by large train-loads, long before the capacity of the road is attained; another economy results when but for the larger train-loads additional tracks, sidings, etc., would be required. But the density of traffic has actually increased greatly since 1897, when, as we have noted above, it was not very much greater than in 1889 (16 per cent. more freight and 12½ per cent. less passenger traffic per mile). From 1897 to 1907 the increase in traffic per mile of road was uninterrupted, except that in 1904 there was 3 per cent. less freight than the year before. The changes in traffic per mile of road from 1897 to 1907 are shown below:

| | 1897. | 1907. | Increase. | Per cent. |
|---|---|---|---|---|
| Ton-miles | 1,028,700 | 519,079 | 509,621 | 98.2 |
| Passenger-miles | 120,516 | 66,874 | 53,642 | 80.2 |

This very great increase in the density of traffic accounts for many things. But, of course, it has not been effected without a great improvement in the roads—additional tracks, sidings, yards, etc.—so that the average mile of road is a very different thing now from what it was in 1897, and the still continuing process of improvement has made the railroads seek great additions to their capital.

Through all this, the earnings, both gross and net, per employee, have changed comparatively little, the gross from $1,371 (in 1889) to $1,549 (in 1907); the net from $438 (in 1894) to $521 (in 1901). We suspect that there are few people, inside or outside of the railroad service, who would think that if the staff of railroad employees owned the whole railroad system and received all its profits, their increase from it would average less than $500 per man. It will be well to bear that in mind when higher pay is asked for.

## THE FIELD AND FUNCTIONS OF THE AMERICAN RAILWAY ASSOCIATION.

The field of the American Railway Association is the whole of the United States (besides some interests of Canadian and Mexican railroads) and its function is to do anything whatsoever for the railroads of America that is within the legitimate and lawful powers of a voluntary association and which the members desire to have done. The truth in this axiomatic statement is brought to mind by the letter, printed in another column, recounting some of the troubles and defects of railroad management. The railroads, sometimes individually, sometimes in local groups, and again in one large group, embracing all in the country, have to meet antagonists far more powerful than themselves, and they ought to have at their command far better association machinery than that which they now have. This assertion about powerful adverse interests may seem exaggerated or incredible; the bigness of the

railroads may be thought so overpowering that to speak of anything that can master them may seem humiliating; but the statement is literally true. The lower railroad associations have done little service in fighting these important battles of the railroads, for the good reason that they lacked the necessary authority, while the larger and more representative association has refrained persistently from exercising the unquestioned power which it possessed. Its record is an illustration of the utmost conservatism, consistently pursued for twenty years. Every competent and strong-minded railroad officer is an autocrat most of the time when he is at home, and naturally he maintains the same attitude of mind when he goes to a convention. The American Railway Association therefore has made very little progress except in matters on which everybody was agreed.

Now, however, there is good prospect of a change. The November meeting will, without doubt, adopt the changes in the constitution or rules of order which were recommended at the last meeting by Messrs. Loree, Potter and Willard (*Railroad Age Gazette*, June 26, page 375), and the association, after the proposed new offices are established, will be in a position to gather and disseminate information far more efficiently than ever before. This, it should be observed, will continue to be the essential function of the association. The new rules provide for an important advance, yet without disturbing that fundamental theory of the organization which forbids the association to dictate to the members. This association is nothing like a trust; and while it is to be hoped that, as an organization of "capital," or of employers, it will be as useful to its constituents as any organization of labor, or of voters (the state) or of commerce (merchants' associations) is to its membership, nothing has been done or proposed which will take it outside of its legitimate field. Even if, in an excess of zeal, some railroad officer should propose to use the association as an instrument to combine the power of a number of railroads—after the manner of the boycott—it is quite certain that, for reasons already suggested, enough independent members would assert themselves to squelch him in short order.

And the simple object named—the gathering and dissemination of information—includes the remedies for all of the evils and deficiencies referred to by our correspondent. That is to say, it includes every remedy, *applicable through a voluntary association*, which is known to be or is likely to be effective. To deal with the strenuous demands of employees' brotherhoods, or the boundless wants of freight shippers, or the endless theories prepared by our paternal government for the benefit of its unappreciative children, any railroad has a problem which requires its best resources. Its wisest officers must give to the matter their earnest attention. Each railroad must fight its own battles. To depend on an association or any outside assistance is futile, except in such matters as subduing lawlessness (as in a strike), where the military or police power may be called upon, or other encroachments which the state or federal government, through a court, clearly has a duty to regulate or repress. An association can do the railroads no important service except in matters which can be made public freely. The air is too full of suspicion toward everything done by a corporation to permit of anything else. This pervading suspicion, however, is no obstacle to the usefulness of a proper association. And a strong association rightly managed can do great things for the railroads just in this field alone; in gathering facts which shall be as free as anything to be found in the New York Library, while yet of value primarily to the railroads alone. In all of the matters which are suggested by our correspondent, or which are included in the reorganization scheme formulated by the A. R. A. committee, the railroads of the country want and need the cooperation of the people of the country. One of the fundamental causes of wars and enmities—that the people opposing each other do not know each other—has its influence here. In every contest or argument between a railroad and a publicity-loving brotherhood; or between a railroad and shippers of freight who fly to the Interstate Commerce Commission or to the White House with every two-cent overcharge; or between the railroads and the Washington bureaucrats who think that railroading is nothing but bookkeeping, the railroad interest can desire nothing more earnestly than the fullest publication of all the facts.

The plan proposed by the Loree committee is so simple that it needs no explanation. Its value will depend on the strength, independence and personal character of the men who are selected to carry it out. An essential feature is the selection of chairmen for the important committees. These men are to devote their energies solely to their chairmanships and thus will be impartial as between different railroads. The public will look upon them still as partisans of the railroad interest; but it will be each chairman's task to so do his work and so frame his public utterances as to nullify this public criticism. Of course, only a big man can do this. A chairman who gathers and publishes facts about railroad wages, for example, must not only state fairly both sides of the question, and be willing, if need be, to allow a piecework shopman twice as much money weekly as he formerly earned; he must be as wise and courteous in dealing with an unprincipled labor leader as with a truthful one; for the first rule of a public discussion is to treat your adversary as your equal. The chairman who deals with shipper and merchant grievances cannot waste his energies on freight agents' rhetoric, nor can he carry his points by indirection; he will need an inexhaustible supply of frankness, and will have to be ready to handle skilfully a hundred new questions every day. The chairman who deals with the government must be able to meet a hundred congressmen and officials on their own ground, and to give courses of elementary and impartial instruction, individually, to most of them. Our correspondent is correct in saying that a big traffic-bureau machine is needed; but the need is not so much for a bigger or a different machine as for one that is more delicately adapted to its uses, and more vigorously managed. An ocean steamship in essentials is like a 20-foot motor boat; the difference between them is in the multiplicity and the intricacy of auxiliary apparatus, and the business energy, the capital, the far-reaching plans and the executive ability which are necessary to make the larger vessel successful and profitable. The difference between our "ropes of sand" in the past and our efficient traffic bureau of the future is somewhat similar.

And so in the other departments; the need is not for change of methods, but for a great increase in the energy and skill which is applied to the methods already in use. The railroad world will await with lively interest the announcement of the names of the men who are to carry out this hopeful scheme of improvement.

## NEW PUBLICATIONS.

*Electrical Engineer's Pocketbook.* By International Correspondence Schools. 3½ x 5½ in.; 414 pages. International Textbook Co., Scranton, Pa. Cloth.

This is prepared as a reference book on electricity and magnetism, dynamos and motors, electric lighting, interior wiring, power transmission, and operation and maintenance of electrical apparatus. The aim was to supply information which is most likely to be needed and used in the daily work of wiremen, dynamo attendants, foremen of construction, managers, engineers, and superintendents of power stations, electric lighting and electric railway systems, and manufacturers and dealers in electrical apparatus and supplies. Among the more important subjects treated are descriptions of dynamos and motors, with the faults to which they are liable and methods of locating the same; the sizes of motors necessary to drive various machine tools; a treatise on the diseases of electrical apparatus; a large amount of data on weights and meas-

ures and the physical and electrical properties of metals and alloys. Alternating current apparatus is included and there are diagrams of connections, data tables and other instruction relating thereto. The methods of controlling the speed of electric cars and multiple unit trains are shown, and there is a section on first aid to the injured in cases of electric shock and other accidents.

*Dynamo-Electric Machinery.* By F. B. Crocker, E.M., Ph.D., Head of Engineering Department, Columbia University. 6½ x 9½ in.; 256 pages; 260 illustrations. The American School of Correspondence, Chicago. Cloth, $1.50.

This is one of the series of handbooks which the American School of Correspondence has been having prepared for some time, primarily for the use of students taking the correspondence courses. They are written for self-instruction and are made simple enough for the apprentice, and yet thorough enough for the skilled workman to learn from them. The present book, in brief, is intended as a complete and authoritative treatise on the theory, construction details, and calculation and design of dynamo electric machinery. The contents are divided into four parts, presenting, in order, the fundamental principles of generators, various classes of generators, calculations and characteristic curves, and the construction of direct current generators. Difficult technical terms have been avoided, as well as formulæ of higher mathematics. However, when the student has mastered the volume he will have a good working knowledge of the subject and will be able to work out the design of a machine himself. The volume is fully illustrated and the printing is in large clear type.

# Letters to the Editor.

## OUR IMPOSSIBLE TRAIN RULES.

Nashville, Tenn., July 31, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

Although the discussion in your columns of the second paragraph of revised standard code, Rule 94, is rather academic, some of the points are not without profitable interest, and I would like to say a word on the views advanced by Mr. Nichols and Mr. Rooke.

The instructions were meant to cover only cases where a train overtook another at a blind siding, held there, by some cause, for an opposing train which was superior to it. In such cases it was thought that unnecessary delay could be avoided by permitting the train thus tied up to move forward on the precedence of the train overtaking it. I do not believe the framers of the rule ever intended men to get the impression that they might pool their orders or time-table authority to run and thus meet opposing trains between stations. To attempt anything so absurd would likely result in collisions even though there were no such rule. But I fear that this is something that some train men might some time do, even though authority for such action be not clearly conferred by rule. If men once get the impression that there is, in the book anywhere, even a vague authority for their action, they will be tempted to try to use such authority.

There is one technicality in Mr. Nichols' case that should prevent both groups of trains from leaving stations at which a part of them were restricted, and that is that when an extra overtakes another it has no right to arrange with the other in the manner illustrated. The rule provides for the case where a train overtakes another of the same class, or an inferior train; but extras have no class whatever, nor inferiority, except as one extra may be given right over another in the same direction. It is hardly to be expected that all of the conditions necessary to cause a collision would be present in any one situation.

Our reason for not adopting this paragraph on our road was not so much through fear of men getting into trouble by pooling orders, as related by Mr. Nichols, as from our apprehension that after the delayed train had been started, in advance of another, the train following might be restricted by the despatcher at a place where the operator afterwards came on duty, and the crew of the train might fail to advise the despatcher that he must not do so. Of course, they should so advise him, for the reason that they had authorized a train to move ahead of them on their precedence. Again, the operator might hold such train by simply displaying his order-signal at stop, as he would have a perfect right to do, and an opposing train might then start before the conductor could reach the office to give notice that he must not be held until the train moving ahead of him had been located and properly restricted.

As to the "low ebb" referred to by Mr. Rooke, I do not know that train and enginemen are retrograding. I am inclined to think that they are better posted now than they were 20 years ago. But the fact remains that very little dependence can be placed upon some of them when it comes to analyzing fine points. It is also true of many that they will, apparently with a determined purpose, try to read into an ambiguous order authority to advance, when such instructions might be construed by another man differently, and when opposing trains might be moving against them.

It may surprise Mr. Rooke to learn that within a year on one of the largest roads in this country a train collided with a superior train between stations on a message telling it to hurry to the next station and do a certain thing. The conductor and engineman appear to have understood this to mean that they could run there regardless of all trains; and they attempted to do so.

It is generally thought that the word "complete" is used in train orders, among other things, for the purpose of keeping conductors and enginemen from using such orders until they are thus endorsed, and that the time that "complete" is given must also appear on the orders before they may be acted on; but I have no doubt that orders which were never completed are used on many roads almost daily. Were I to have made a record of every case of this kind coming under my personal observation on the eight roads upon which I have been employed, I could show probably a thousand such incomplete orders which had been acted upon. I will not say that some men would accept a milk ticket in lieu of a clearance card, but they might just as well do so, since they accept clearance cards not properly filled out. There are places where this occurs almost daily. If every inspector were to discontinue checking up orders for a year, there is no telling what looseness of construction and of penmanship would by that time be common.

There is another shortcoming of train men that Mr. Rooke should notice: their propensity to take criminal chances. If it is possible "by the skin of the teeth" to make a station for a superior train, will any experienced railroad man contend that there is a road anywhere in America on which every one of two thousand trainmen will always religiously respect the five minutes' clearance which is provided to insure against a possible variation of watches? There will always be some who, if necessary, will use up to the opposing train's leaving time. And will not always at least a few, on a pinch, even go so far as to run against a superior train if they can only get in sight of the station? To make the switch, at which they must head in, by the time the opposing superior train is due to leave, by time table or order, seems to be thought almost the same as complying with the rule.

But what is there to be gained by discussing facts which must be patent to all and for which no adequate remedy can be applied under our rules and train orders? Why not abandon the whole dangerous and complicated system and provide only about four vital things for men to look out for and be governed by? A fixed semaphore signal which shall indicate "stop," "caution," or "proceed," and a banjo signal to indicate "hold main track" or "head in." Why should not de-

spatchers run their trains in this simple manner? Were this to be done, the saving in time alone would eventually pay for the installation, to say nothing of the saving of money now paid to widows, or to repair cars and engines smashed up in collisions which are due to forgetting orders or trains, taking foolhardy chances and disobeying clearly written rules.

While train rules and train orders are used, it will be my duty to make every effort to prevent misunderstandings under them, but it will always be difficult to satisfactorily bolster up a system which is defective both in theory and in practice.

I shall greatly rejoice when rules and orders, and the tedious, unsafe man-killing Morse system of imparting information are discarded, and the more up-to-date block system and the telephone are generally adopted.

H. W. FORMAN.

## NEED OF RAILROAD CO-OPERATION.

New York, August 8, 1908.

To the Editor of the Railroad Age Gazette:

The tedious agitation concerning a possible increase in freight rates which has filled the newspapers so much of the time during the past two or three months has once more made painfully evident the fact that the railroads of the country have no effective legal or other machinery with which to meet a well-organized antagonist (in any field) or even to restrain indiscreet railroad officers who rush out to the fray when it would be the part of wisdom to remain inactive and silent. The most prominent railroad officers seem to be hopelessly divided. A prominent vice-president of the New York Central declares in favor of making an advance in rates at as early a date as possible. The Pennsylvania seems to be equally positive that no advance should be made at present. The most astute officers of a number of roads evidently see and firmly believe that nothing of importance can be done at present; but apparently they have little influence with their neighbors. The merchants, on the contrary, are all agreed. They are unanimous in the opinion that no advance in rates can be accepted. A secretary representing 10,000 merchants, or pretending to represent that number, will express a certain view in the newspapers, and no one denies what he says. The Illinois Manufacturers' Association, with headquarters at Chicago, and the Merchants' Association of New York City send out their letters by the tens of thousands, telling the merchants what they ought to do, or what they ought to believe, and there is no trouble in getting an overwhelming affirmative vote on any proposition thus put forth. The railroad men try to make clear how the burden of a small advance in the cost of transportation on valuable goods will not fall on the tradesmen; but people do not seem to care whether this railroad proposition is proved or not. The serious thing to remember in this matter is that public opinion—that is, the newspapers and the men of supposed influence, who lead reporters by the nose—very likely will decide the question. The railroads may, indeed, have an incontestable case when it comes to presenting the controversy before the courts, but by that time it will be too late.

Why do not the railroads have a really strong traffic bureau? There should be an establishment of this kind, unanimously supported and endorsed by the railroads, which could make itself felt in the press of fifty cities in a single day. This would mean a good deal of machinery; but in covering a territory as big as the United States some little machinery is an absolute necessity.

There is the same lack of organization in other matters which vitally affect the welfare of the railroads of the country. At the recent meeting of the Air Brake Men's Association, the legitimate business of which is to discuss the management of air-brakes, a representative of the government, or at least a man who was accepted as such, made a few desultory remarks concerning the federal law affecting the use of air-brakes, how that law is working, and how the railroads ought to conduct themselves in relation to it; and this man's remarks, though entirely unofficial, will, when printed in the proceedings of the association, and circulated broadcast, have the same effect as a statute passed by Congress and signed by the president. I do not assert that this man said anything inimical to the railroads, or that he laid down the law in any other than the correct way. Nevertheless, the incident serves to illustrate how in this matter the interests of the railroads are almost entirely neglected by the railroad managers themselves. The application of the federal law to the use of the air-brake on freight trains is an intricate and troublesome problem. There is need of the most careful consideration of every step that is taken. Yet the executive officers of the railroads are in large measure ignorant of the precise details of the situation; and individual members of their mechanical staffs, sitting in the Air Brake Men's convention—perhaps possessed of good judgment, and perhaps in some cases not so possessed—are left to pursue their own individual courses in the matter. The government, on the other hand, has a definite policy, and evidently has a free hand in carrying it out, and this without regard to any adverse effect which such a policy may have on the interest of any railroad. Ostensibly, the use of air-brakes on freight trains is regulated by a statute of Congress. In fact, it is regulated almost wholly by the secretary of the Interstate Commerce Commission, or by men, who acting under his authority, are deputed to administer the law.

If any reader, not acquainted with these facts, doubts the accuracy of this characterization, let him look at the way in which the federal laws affecting freight cars have been dealt with by the Master Car Builders' Association for the past few years. Here again the duties of the railroads are supposed to be defined by a law of Congress, but there would seem to be a large number of railroad officers who are not fully conversant with the terms of this law; while the secretary of the Interstate Commerce Commission, speaking unofficially and wholly without authority, comes to the annual meetings of the association and lays down the law according to his own interpretation thereof. I am not saying that he promulgates any unlawful notions, or that the men who listen to him are not to be trusted to accurately distinguish between truth and error in these fine legal points in case he gives them a mixture of the two; but it is clear, as a matter of fact, that the master car builders are learning their law in a wholly irregular way. The executive officers of the railroads, who know what the law is, should see that their rights under it are protected. They are the men to act; they should see that communications or comments which purport to come from the government really do have their origin in some well-defined authority.

Why does not the American Railway Association take this matter up?

The railroad accounting officers, dealing with an important branch of railroad management which just now is being minutely watched by the government, have done as they pleased for several years past, and seem now to have committed the railroads of the country to methods of accounting which are inimical to the interests of the railroads generally, and all because the accounting officers have not been required to keep themselves closely in touch with their executive superiors, and, probably, have been unduly influenced by unofficial and perhaps ill-advised communications from a government official.

The legal departments of our railroads also have to deal with important matters which should have the benefit of some organized co-operative machinery. It is true that the railroad lawyers of the country are more fully in touch with each other and more fully prepared to secure the benefits of each others' counsel than are the heads of any other of the departments. Every lawyer follows the decisions of the courts, in distant as well as neighboring states, and in general is usually

prepared to take advantage of any legal decision which may be rendered in any state; but still much more could be effected if there were more active and definite co-operation. The interest of a railroad may suffer, not only by ignorance of some judicial decision rendered in a distant state, but also by ignorance of what is being done in the way of preparing suits to test new or imperfect laws. It is high time that all of the legal knowledge of the several railroad legal departments of the country were made available, on short notice, for the use of any railroad needing it. In the Eastern and Western railroad associations this condition has already been brought about, to a large extent, as regards one department of the law, *i. e.*, patents; but other departments should be equally well equipped. The large question of employers' liability for personal injury to employees is one which now has come to be of the highest importance, and every bit of useful information should be quickly passed around.

Last, but not least, why do not the railroads secure the benefit of organization and co-operation in dealing with labor unions? An insignificant grievance committee, representing perhaps a few hundred men, comes to the superintendent of a division and presents a grievance which perhaps might reasonably be settled without going beyond the limits of the division; but this committee of employees calls in its "chief," and has the benefit of the knowledge and argumentative ability of all the chief officers of the union, who are thoroughly familiar with controversies like the one in hand. They have had experience in dealing with the same kind all over the country, and the local grievance is made a general issue throughout perhaps a half dozen states. The superintendent, on the other hand, in a case of this kind often finds himself obliged to maintain his side of the controversy with the most limited knowledge—or at least a knowledge which is decidedly limited as compared with the complete information possessed by the other side. If the employees are thus solidified throughout the country, why should not the employers avail themselves of an equally compact classification and compilation of their knowledge? The Chicago General Managers' Association has done a little now and then in the way of co-operation between railroads; but speaking of railroads generally they seem to be fearful of the law, or of each other, and each keeps aloof from all others. But what is there to be afraid of? F. F. L.

## MINIMUM GRADE AND MAXIMUM TRAIN.

Richmond, Va., August 13, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

In my letters of May 28 and June 9, which appeared in your issues of June 5 and July 3, I showed from the statistics of the Interstate Commerce Commission for the year ended June 30, 1906, that the mileage of revenue trains during that year was 1,105,877,091, and that the expenditures for motive power, train service and train supplies and expenses were $578,493,022, or 52.31 cents per revenue train mile, as follows:

| | Amount. | Per train-mile, cents. | Per cent. of total cost of operating. |
|---|---|---|---|
| Motive power | $456,864,468 | 41.31 | 29.794 |
| Train service, supplies & exp. | 121,628,554 | 11.00 | 7.932 |
| Cost of movement | $578,493,022 | 52.31 | 37.726 |

This 37.726 per cent. of total operating expenses, which amounted to 52.31 cents per revenue train mile in 1906, is the only part of them that will be more or less per passenger-mile or per ton-mile in proportion to the average train loads of passengers or freight. When the revenue train loads are increased without increasing the motive power and train expenses per revenue train mile, it requires a proportionately less number of revenue train miles to handle the traffic, which makes a saving in the cost of movement. On the other hand, however, if the motive power and train expenses increase in a greater ratio than the average train loads, as was the case during the five years of prosperity from 1901 to 1906, all of the saving from increased train loads and more is lost.

It would be natural to suppose that in a period of depression, like the present, the wages of train crews would be reduced and that train supplies and expenses would be less, but such does not seem to be the case, and it is not to be expected that average train loads can be still further increased with so many cars lying idle. It certainly looks as if the only thing the railroads can do is to raise their rates to compensate for the increased cost of transportation for which they are in no way responsible.

The efforts of the transportation departments of the railroads "to make both ends meet" have generally been in the direction of increased train loads, and they have been liberally supported by large outlays of new capital for larger locomotives, heavier rails, stronger bridges, lower grades, etc., but they seem to have reached the limit of their ability to reduce the cost of transportation, and are calling on the traffic departments for help to avert disaster, by raising rates.

There is little time to consider when the demand for transportation exceeds the supply, and it may be doubted whether the large outlays of capital to reduce grades and curvature have in all cases been justified by the results. Would it not be well to avail of the present "breathing spell" to consider what saving may be reasonably expected from contemplated outlays for the purpose of enabling locomotives to haul heavier trains?

During the year ended June 30, 1906, not only were the train loads greater than ever before, but the cost of operation per revenue train mile exceeded all previous records. For this reason calculations of future saving based on the results of that year should probably be discounted.

For our present purpose it may be affirmed that all railroads are operated nearly equally in both directions, and therefore the train resistance due to gravity depends upon the sum of the ascents in both directions less the help afforded by so much of the descents in both directions as can be availed of to assist in propelling trains. It is hardly necessary to say that as the ascents in one direction are descents in the other, the sum of the ascents and descents both ways must be the same, and if all the gravity force on descending grades could be made available to move trains it would double the effect of additional power required to ascend the same grades with trains of the same weight. In ascending grades, the elevation overcome determines the gravity resistance. On descending grades only so much help is given by gravity as will enable the train to make the desired speed without any resistance from the locomotive, and if the gravity force is more than that it must be controlled by brakes, and is expended in wearing out wheels and brake shoes.

The rate of ascent, or angle of inclination, determines the maximum train a locomotive will pull. The rate of descent determines what proportion of the gravity force can be utilized to move trains and how much of it will be expended in wearing out wheels and brake shoes; but further than that, the rate of ascent or descent does not influence the cost of motive power.

The object of grade revisions is to lower the cost of moving trains by reducing the power required to overcome gravity resistance, and as every foot of elevation requires 2,000 more foot pounds of power per ton, that much power is saved on every ton of locomotives, cars and loads which ascends the grade, by cutting down the summit one foot; but if only the rate of ascent is reduced without lowering the summit of the grades, while one locomotive can pull more train, the power required to overcome gravity resistance is the same per ton.

The elevations to be overcome depend first and foremost on the difference in elevation of the termini of the road, which cannot be changed; and there may be, and generally are, intermediate points on the line the elevation of which cannot be materially changed, if at all. Such natural conditions may make it impossible to reduce gravity resistance appreciably, if at all, and in such case only a reduction in rates of ascent is practicable. If the work required to do this is costly, the

interest charges on outlay may be greater than the saving from increased train loads.

Lower grades or, more properly speaking, lower rates of ascent do not make heavier average train loads; they contribute to that end, but unless the volume and distribution of the traffic as to location and time of movement are such as to admit of a large proportion of it being handled in maximum train loads, the results in the direction of economy may not be appreciable.

If, as seems probable, outlays for grade revisions have not always been productive of good results, consideration of the above facts and principles may help to reconcile some who aspire to low grades at any cost to their present constraint; and in the interim before the return of prosperity leisure time might be profitably employed in ascertaining how it is that high grade roads survive in competition with low grade roads. They will surely find that the heaviest average train loads are not always to be found on the roads with the lowest ruling grades.

T. M. R. TALCOTT,
General Manager of the Tidewater & Western R.R.

## REASONABLE RATES.

Cambridge, Mass., Aug. 10, 1908.

To the Editor of the Railroad Age Gazette:

The interesting contribution on "Reasonable Rates" in your issue of August 7 deserves attention. May I offer very briefly a few objections to its reasoning?

Dr. Raymond believes that rates, in order to be reasonable, should on the whole produce a "reasonable profit rate of the total business done." That is, the railroad should obtain a profit on its sales of the commodity "transportation" which corresponds to the usual profit on sales in mercantile and manufacturing lines, due allowance being made, I presume, for differences in risk. That this is desirable may readily be admitted. That the argument in its favor differs, however, as the author implies, from the ordinary statement that a reasonable level of rates is one which on the whole yields a normal return to the capital invested in railroad enterprise, does not seem to follow. In no line is the profit on sales itself determining. The business man chooses that one of different fields which promises him the largest profit on his capital invested. He regards the percentage of profit on sales as one factor only in arriving at his net return. In some lines sales are likely to be large, but the percentage of profit small; in others, comparatively few sales can be made, but the profit on each will be considerable.

If it be true that the gain on each transaction is important only in its relation to the profit on capital invested, then Dr Raymond has supplied us with no new criterion by which to judge of a level of rates. His method of testing individual rates is open to sharper criticism. According to his statement, the reasonable rates on an article, the possible supply of which is large, is that rate which will move the economic maximum of the commodity. The economic maximum is the amount which, multiplied by the rate applied, will yield to the railroad the highest net return. From the point of view of the carrier, this is correct. A similar principle might be defended by any monopoly. But is it true that the rate which will afford the highest net return to the seller is presumably the reasonable rate from the point of view of the buyer? Dr. Raymond thinks it is. Shippers are likely to disagree.

Thirdly, Dr. Raymond elaborates the proposition that in the case of any article of very limited supply, all of which will move at any profitable rate, the reasonable rate is one which will pay the transportation company a share in the total profit proportionate to the transportation company's share in the total effort of production and sale. As a principle this seems clear and attractive. Two objections may be made. First, as Dr. Raymond admits, that the total effort of production is extremely difficult to ascertain. Second, that when determined and apportioned, it has properly no bearing on the reasonableness of any rate. This may be illustrated by the case of paintings, executed by an artist of reputation. The supply of these paintings is limited, and they will move at almost any rate. Now in the first place, the total effort of production of these paintings is impossible to estimate. It should include the effort expended in previous study, in long practice—in short, it should reckon with the work of a large part of the artist's life. In the second place, even though the total effort of production could be estimated, the railroad would have no right to a share in the total profit proportionate to its share in this effort. For the value of the paintings includes two elements. There is a part which compensates for the effort expended, and there is a part, a monopoly element, due to the rarity of the artistic talent of which the pictures are the expression. For its services the carrier should be paid. I cannot see that it is entitled to more. If it has power to take more, it is because it is itself a monopoly. The proportion which its efforts bear to the total effort of production will neither limit nor increase the amount which it secures. In practice railroads charge high rates on valuable products in order to secure the greatest possible revenue with the least possible burden upon shippers. The portion of monopoly value which they appropriate in this way, however, only accidentally corresponds with the proportion which the effort of transportation bears to the total effort expended. The criteria of reasonableness being changed, then results will differ.

It is not a grateful task to criticize a temperate, earnest attempt to throw light on the perplexing problem of reasonableness in railroad rates. To my mind, at least, the question will never be settled by a comparison of cost or profit. It is a matter rather of economic and social statesmanship. That general adjustment of rates is reasonable which distributes the industries of the country in the localities best fitted naturally to receive them. Provided that, in the course of the distribution, social evils do not arise which counterbalance the economic gains. But whether or not Dr. Raymond's attempt to outline the criteria of a reasonable railroad rate was foredoomed to failure, the readers of the *Railroad Age Gazette* are indebted to him for his discussion.

STUART DAGGETT,
Instructor in Transportation, Harvard University.

## CAR FLOATS ON THE NYPANO.

New York, August 7, 1908.

To the Editor of the Railroad Age Gazette:

In the interesting account of the "Nypano" in the *Railroad Age Gazette* Aug. 7, is the statement that in 1883 "at Cape Charles trains were not to be unloaded, but the cars were to be pushed on barges and ferried across the Chesapeake & Norfolk—something then unheard of in either railroad or water transportation." How about the water transfer on the B. & O. at Baltimore; the transfer of the N. Y., N. H. & H. at New London; the transfer of trains at Havre de Grace, Md., on the P., W. & B. before the first bridge was built there in 1867, and the transfer on the C. P. at Oakland? All years before 1883.

F. C.

[The author of the description of the New York, Philadelphia & Norfolk believes he was quite correct in the statement that the N. Y., P. & N. was the first line in the country to introduce the system of long distance water transportation by tug and barge for freight cars. It was not his intention to ignore the few short distance freight and passenger transfer boats that were in operation at New York, Baltimore, New London and Oakland, where the service performed was by means of a large transfer steamboat holding a few passenger or freight cars and moving either across a narrow river or within the limits of a harbor. But the N. Y., P. & N. problem was quite a different one. When Mr. Cassatt proposed to build car floats of 30-car capacity to be towed by

strong ocean-going tugboats for a distance of 36 miles across the mouth of the Chesapeake bay, where the water conditions are most uncertain, the idea was not looked upon with much favor by transportation men. They doubted its feasibility. The success of the plan is of course now fully understood, and a similar service has been introduced on several of the Great Lakes and at other points where combined rail and water movement was necessary.—EDITOR.]

## OPERATING DEPARTMENT ACCOUNTS—THE BASIS OF ACCOUNTING DEPARTMENT RECORDS.

BY FRANK H. CRUMP,
Assistant to Auditor: San Pedro, Los Angeles & Salt Lake.

The accuracy and efficiency of the records kept by the accounting department depend upon operating department reports. The official on the ground is in much better position to obtain an accurate accounting for the operations of a department than the accounting department, situated usually at a distance from the seat of operation and unacquainted with the physical conditions. Operating departments should therefore be responsible for the accuracy of their records and should furnish the Auditor with the necessary data for accounting purposes, as well as *provide themselves* with proper information for operating purposes, without duplication of labor. The reports rendered the accounting department should, however, be prepared in such a manner as to be susceptible of an audit.

Such method of accounting among railroad companies and large corporations has been adopted to a limited extent only, the tendency being to make little use of department records and throw the burden of the work on the Auditor, who, instead of auditing, is in reality being audited.

Each department should be accountable for its own expenses and should prepare its own pay rolls, vouchers payable, bills collectible and department bills, on forms prescribed by the Auditor, and made in triplicate so that the department, as well as the Auditor, will have a complete record, without duplication of labor.

Departments should be required to furnish monthly distributions of pay rolls, vouchers payable, bills collectible, department bills, etc. These distributions place departments preparing them in close touch with their own operations, and the head of the department will find this the best method of securing the facts; and possession of all the facts is essential to a proper accounting. These distributions and working sheets should be on loose leaves of convenient size for binding.

### DEPARTMENT NUMBERS.

The system of numbering pay rolls, vouchers payable, bills collectible, department bills, etc., is an essential feature of department accounting. As a means of identifying department documents, a number should be assigned, by the auditing department, to each operating department, which number should be used as a prefix number and placed by the operating department in front of the pay roll, voucher or bill number to indicate the department originating the document.

As the monthly system of accounting has been universally adopted, the month in which a document is issued should be shown in connection with the number, for example: a department to which has been assigned Department Number 10 should number its pay rolls for May, beginning with No. 1, thus: May 10-1, May 10-2, May 10-3, etc. Numbers should begin with No. 1 each month.

All papers for each month should be filed by the Auditor together, that is all vouchers, in numerical order, all pay rolls, all bills collectible and all department bills. An accurate idea of space to be occupied by each month's documents may be obtained from the previous month. This is a great improvement over yearly numbering, for if vouchers or bills are numbered beginning with No. 1 each year, no idea of the space required for the several classes of documents can be obtained, and no systematic method of filing is possible.

### DEPARTMENT REQUISITION NUMBERS.

Department requisitions for material should be numbered in the same manner as pay rolls, vouchers and bills, except that the numbers should begin with No. 1 each year as no accounting is made of them as requisitions.

Storehouse invoices to cover the value of material furnished on requisitions should be given the same number as the requisitions. For example, if a department to which has been assigned the number 10 makes requisition No. 10-40, the store invoice covering the cost of such material should be numbered 10-40.

General Storekeeper's requisitions on the Purchasing Agent should be numbered in the same manner. For example, if department No. 10 makes requisition No. 40 it would be numbered 10-40, and the General Storekeeper's requisition on the Purchasing Agent should be numbered 10-40.

The Purchasing Agent's order for the material covered by General Storekeeper's requisition 10-40 should also be numbered 10-40. Shipper's invoices should refer to the order, No. 10-40, and shippers should also mark the goods 10-40. The department receiving the goods thus knows at once on which requisition they were ordered. Store distributions of material should show invoice number (which is also the requisition number). Carbon copies furnished departments will then enable them to obtain the cost of each requisition.

The department requisition number follows the transaction from the time the material is ordered until received and vouchered, and only one number is used, instead of a multiplicity of numbers, none of which is of value as reference without the others.

### DEPARTMENT PAY CHECK NUMBERS.

Pay checks should be given the same number as the pay rolls, adding the line number. For example, a department to which has been assigned Department Number 10 would number its May pay rolls May 10-1, May 10-2, etc. The checks for May pay roll 10-1 should be numbered May 10-1-1, May 10-1-2, etc. The month, with the number of the check, thus refers to the pay roll and line on which the name and amount appear.

### AUDITOR'S VOUCHER AND BILL REGISTERS.

The registers used in the accounting department for recording vouchers payable, bills collectible, department bills, etc., should be loose leaf, with an index sheet between each two months.

Each department's vouchers or bills should be registered on separate sheets and assigned the same number given by the department. In other words, the department number of the voucher is also the audit number. Sheets 11 in. x 17 in., bound on the right-hand margin and notched on the left-hand margin to show department number and sheet number, are very convenient for voucher and bill registers.

The register should show the following information: Date registered, number, name, for, amount, date paid. No provision should be made for distribution, as each department should render monthly distribution of its vouchers. Paid vouchers should be entered on Treasurer's disbursements first by months, second by departments, and third by number.

### PAY ROLL REGISTER.

Each department should furnish a summary of pay rolls, showing number and amount of each roll, and the Auditor should make a grand summary of the department summaries. Pay rolls and summaries bound for each month, one or more volumes, make convenient pay roll registers. Pay rolls should be 11 in. x 17 in., and bound on the left-hand margin. The right-hand margin should be notched to show the roll number.

### PAY CHECK REGISTER.

The bound pay rolls make the pay check register, and a column should be provided on the right-hand margin for "date

paid." The check number refers to the roll and line number and paid checks should be filed in roll and line number order. Time checks should provide space for entering, after payment, the roll and line number, and should be filed with pay checks in the proper order. Pay checks should be entered on Treasurer's disbursements by months, and in roll and line number order.

MATERIAL ISSUES.

Each department having a stock of material should furnish Treasurer monthly with distribution of material issues.

DEPARTMENT BILLS.

Each department should furnish the Auditor with monthly distribution of charges transferred from one department to another by department bill.

AUDITOR'S RECAPITULATION OF DEPARTMENT DISTRIBUTIONS.

The Auditor should make a separate recapitulation of department monthly distributions of pay rolls, vouchers payable, bills collectible, department bills and material issues, which recapitulations will form the basis of the monthly journal vouchers.

DEPARTMENTS OF THE AUDITOR'S OFFICE.

The same plan should be applied to the departments of the Auditor's office, i.e., the records in each should be made with a view of providing data for their own needs and also for furnishing the Auditor with the results of each month's work in the form of a journal voucher, which should be loose leaf, of convenient size for binding, and should be made in triplicate. The original should be approved and forwarded to the general bookkeeper, and the duplicate kept for the file of the head of the department. The triplicate should be kept by the clerk preparing the entry.

---

Applying the principle here set forth the accounting pyramid, on its solid foundation, may be illustrated thus:

P. & L.
INCOME ACCT.
OPR. REV. & EXP.
GENERAL LEDGER.
SUBSIDIARY LEDGERS.
JOURNAL VOUCHERS.
AUDITOR'S RECAP. DEPT. DISTBNS.
DEPARTMENT MONTHLY DISTRIBUTIONS.
DEPARTMENT WORKING SHEETS.
ORIGINAL RECORDS OF DEPARTMENTS.
ORIGINAL REPORTS OF EMPLOYEES OF DEPARTMENTS.

## PICKED UP ON THE ROAD.

BY GULF.

Week before last, while traveling on a well-advertised road in Ohio, I noticed that one or two unscheduled stops were made between B and C. As we slowed up in C, the conductor told me that he was going to get a new engine. Instead of this, however, the roundhouse gang at C put in new brasses and repacked one of the tender journal boxes which was ailing, and then the same engine continued down the road. Between C and D we ran at reduced speed with frequent stops, and the conductor and brakeman took permanent positions at the side of the train and kept their eyes riveted on that journal box. They expected the axle to break, and presently it did break, with all hands watching it, and the train moving at a walk, some 47 miles south of C.

The next thing to do was to get the engine off the main line, in the interests of traffic in general. The journal box was not lifted, but was allowed to hang down and drag along the ties, while the engine slowly proceeded toward the nearest available siding. When it got to the siding, the journal box could not be jacked up high enough with the jack carried on the engine to clear the rail, so we lay there, waiting for the wrecking car, and fouled the main line for several hours while trains overtook us and closed in behind. The train crews of these following trains contributed absolutely nothing by way of suggestion or co-operation, and the representatives of the mechanical department on our train—that is to say, the engineer and fireman, stayed in the locomotive and betrayed as much interest in the proceedings as a motorman betrays in the color of his passengers. The conductor and baggageman did what little was done in the way of helping the journal box over rough places, but the general attitude of all hands was apparently that their duties did not include getting trains over the road, except where all conditions were entirely favorable.

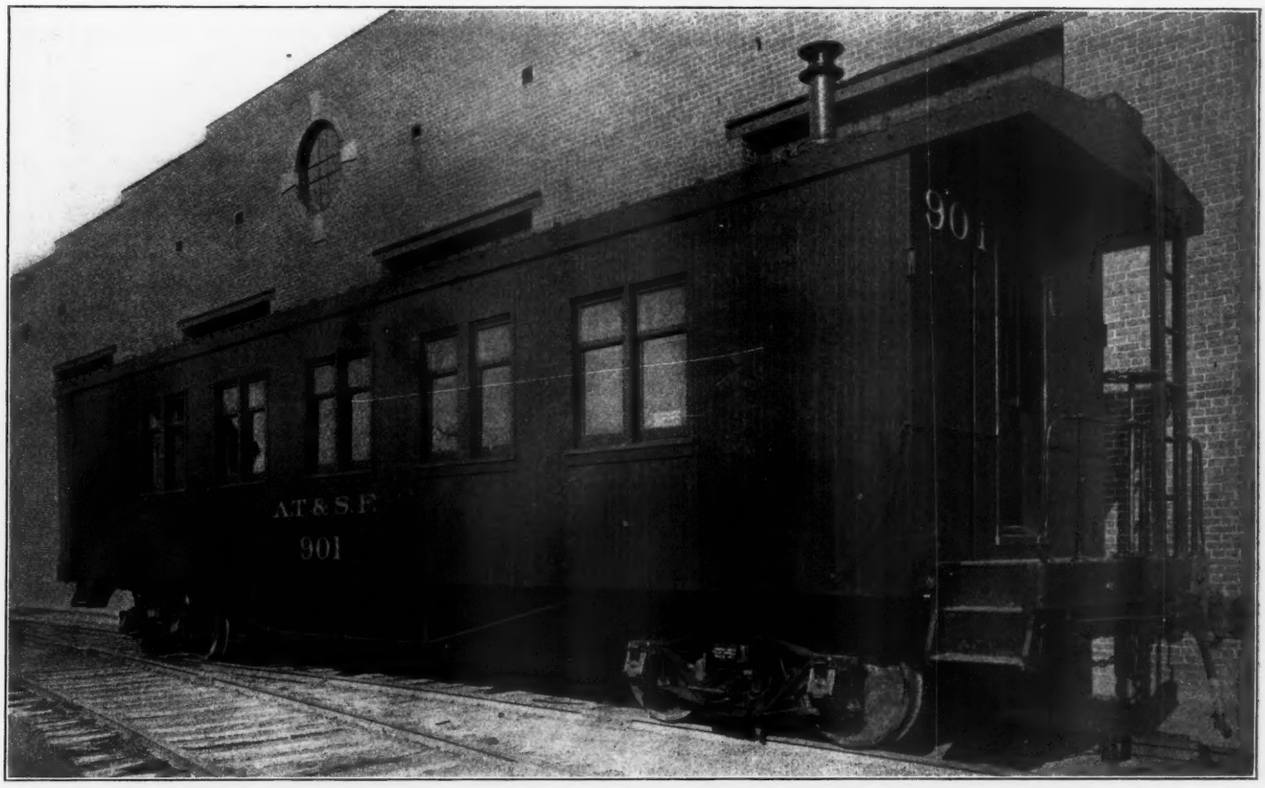
The passengers on that train had no opportunity to get any food between 9:25 a. m., at C, and 8 p. m., at F. No stop was made long enough to procure food at restaurant stations, and no dining car was attached to the train, although one was scheduled to be in it for approximately half the distance. It seemed to me that this combination of events justified a letter to the general passenger agent, who is supposed to be very much interested in such matters. I, therefore, contributed to him my belief that: (1) If an entire crew expected the axle to break at C and were not willing to run on schedule speed on account of it, good management demanded that a new engine be put in. I also pointed out (2) the failure of the train crew to put a block under the journal box and get the disabled engine off the main line, or if such failure was due to the fact that the engine carried no jacks of sufficient capacity to lift the journal box, then I pointed out that the company ought to provide an adequate jack, since lifting the journal box would be about the lightest service around an engine to which a jack could be put. I also pointed out (3) the failure of the railroad company to supply a dining car when it was scheduled, or to make other arrangements for supplying passengers with food.

The passenger agent replied to the first of the allegations that he did not think the crew could be blamed for taking a chance on getting the engine into its terminal after a hot box occurred. He said it was not customary for an engine to carry a jack large enough to perform the easy task I specified and, in discussing the dining car situation, he simply said that dining cars had now become so common that the eating stations along the road had deteriorated, and that experience had demonstrated to the company that a passenger would rather go without his meals than take them at any place that was not strictly first-class. If he had frankly said that in the interests of severe economy dining cars were being omitted from as many unprofitable runs as possible, he would have explained satisfactorily enough why the dining car was not on the train, but not why it was on the time-table. As regards the possibilities that the axle would or would not break, I am narrow-minded enough to think that the value of the time of the 75 passengers who were delayed on my train and the 200 or 300 others who were delayed on trains following ought to have had some weight with the local authorities at C, when they decided, against the opinion and belief of the train crew, that the engine could go on as it was.

## DROVERS' CARS FOR THE ATCHISON.

The Atchison, Topeka & Santa Fe is building nine drovers' cars in its Topeka shops for use on stock trains between Kansas City and Newton, Kan., and more especially between Kansas City and Emporia, Kan. The heavy shipments of stock from the west and southwest are through Emporia and more of the trains get out of there from 8 to 10 o'clock at night, making night run into the Kansas City market. The company has built these cars for the accommodation of the shippers or attendants accompanying the stock. Each of the cars is 40 ft. long and contains 10 full sections with accommodations for 40 men; also a closet and two lavatories.

The Atchison handles about one-fourth of the stock that goes into the Kansas City market and is giving special attention to the movement of stock from the Southwest, making




Exterior of Drovers' Car; Atchison, Topeka & Santa Fe.

Interior of Drovers' Car; Atchison, Topeka & Santa Fe.

every effort to get it into Kansas City in time for the early market. These drovers' cars will no doubt be appreciated by the stockmen, who will be in better physical condition to transact business in Kansas City after having spent a comfortable night in these drovers' cars.

## TRAIN ACCIDENTS IN JULY.[1]

Following is a list of the most notable train accidents that occurred on the railroads of the United States in the month of July, 1908. This record is intended to include usually only those accidents which result in fatal injury to a passenger or an employee or which are of special interest to operating officers. It is based on accounts published in local daily newspapers, except in the cases of accidents of such magnitude that it seems proper to write to the railroad manager for details or for confirmation.

*Collisions.*

| Date. | Road. | Place. | Kind of Accident. | Kind of Train. | No. persons reported Kil'd. | Inj'd. |
|---|---|---|---|---|---|---|
| 1. | C. G. W., C., R. I. & Pac. | Des Moines. | xc. | Ft. & P. | 1 | 3 |
| †2. | Mo. Pac. | Knobnoster. | bc. | P. & P. | 5 | 36 |
| †4. | So. Pac. | Oakland. | xc. | P. & P. | 6 | 14 |
| †4. | N. Y. Central | Boonville. | bc. | P. & Ft. | 6 | 14 |
| 6. | Chic., Rock Isld. & P.—Wabash. | St. Louis. | xc. | P. & Ft. | 0 | 3 |
| 9. | N. Y., Susq. & W. | Summit. | bc. | Ft. & Ft. | 0 | 3 |
| 12. | Tex. & Pac. | Queen City. | bc. | P. & P. | 0 | 18 |
| 14. | St. L., I.M. & S. | St. Louis. | bc. | P. & Ft. | 2 | 7 |
| 23. | Gr. Rap. & Ind. | S. Boardman. | xc. | P. & Ft. | 0 | 6 |
| 23. | Chic., L. S. & E. | Buffington. | bc. | Ft. & Ft. | 1 | 4 |
| 31. | S. L. & Ogden | Salt Lake | xc. | P. & Ft. | 1 | 2 |

*Derailments.*

| Date. | Road. | Place. | Cause of derlmt. | Kind of train. | No. persons reported Kil'd. | Inj'd. |
|---|---|---|---|---|---|---|
| †1. | Tex. & Pac. | Boracho. | washout. | Pass. | 4 | 3 |
| 3. | N. W. Pac. | Novato. | cow. | Pass. | 0 | 2 |
| 5. | Central Ga. | Butler, Ga. | cow. | Ft. | 2 | 0 |
| 6. | C., R. I. & Pac. | St. Louis. | derail. | Pass. | 0 | 3 |
| 8. | Erie | Huntington. | b. rail. | Ft. | 1 | 0 |
| †16. | N.Y., N.H. & H. | Greenwich. | unx. | Pass. | 1 | 12 |
| 18. | West'n Md. | Westernport. | unx. | Pass. | 0 | 3 |
| 18. | Y. & M. Val. | Burnside. | malice. | Pass. | 0 | 6 |
| 22. | Erie | Marion. | ms. | Pass. | 0 | 2 |
| 23. | Colo. Spgs. & C.C. | Fairview. | unx. | Pass. | 0 | 2 |
| 26. | St. L. & S. F. | Goodland. | unx. | Pass. | 3 | 2 |
| 26. | Erie | Hornell. | b. rail. | Ft. | 1 | 1 |
| 30. | A. T. & S. F. | Wakarusa. | d. truck. | Pass. | 1 | 20 |
| 30. | So. Pacific | Marysville. | b. wheel. | Ft. | 1 | 0 |

*Other Accidents.*

| | | | | | | |
|---|---|---|---|---|---|---|
| 8. | Bos. & Maine | Somerville. | acc. obst. | Pass. | 0 | 20 |

The collision near Knobnoster, Mo., on the 2d, causing five deaths, occurred in a dense fog, and the trains were running at high speed. Two of the killed were passengers. The two trains, No. 3, westbound, and No. 12, eastbound, held orders to meet at Knobnoster. When No. 12 arrived at Knobnoster, No. 3 being then at Lamonte—the next station east and seven miles distant from Knobnoster—the train dispatcher undertook to change the meeting point from Knobnoster to Lamonte. This change was made by "31" order, and the order thus given was accepted by the operator at Lamonte before he had made certain that No. 3, which had passed his train order signal, had been held. The train dispatcher then gave the order to No. 12 at Knobnoster, which immediately proceeded to act upon it; and, before the operator at Lamonte could reach No. 3, which was at the west end of the siding, it left there for Knobnoster under the order originally given, and the trains met between Lamonte and Knobnoster, at a point where, by reason of the curvature of the road, the enginemen could not see each other until quite close together. According to the reports there was a question of veracity between the operator and the dispatcher as to whether the dispatcher knew that train No. 3 was not definitely held at Lamonte, when he gave No. 12 the order to proceed from Knobnoster.

The collision at Oakland, California, on the 4th was at a crossing, and all of the killed were passengers. The engine of one of the trains, running tender first, struck and crushed the smoking car of the other train.

The collision near Boonville, N. Y., on the 4th, was between a northbound passenger train of two engines and nine cars, and a southbound freight. It occurred at 5:32 a. m. The passenger train was running at about 25 miles an hour, and the freight about 10 miles an hour; and three engines, two freight cars and two baggage cars were badly wrecked. One passenger and five trainmen were killed and three passengers and 11 employees were injured. A farmer living near the place of the collision says that he signaled to the freight train with his hat, and that if the signal had been heeded the freight train could have been brought to a stop. The collision was due to an error in a dispatcher's order. By this order the passenger train was to wait at Boonville until 5:15, but as delivered to the conductor of the freight it read 5:55, and, acting on this order, the freight used 40 minutes more on the time of the passenger train than it could safely use. For the error in the order as delivered the person held responsible is Mrs. E. R. McLane, operator at Lyons Falls, 29 years old, and in the service of the road as operator only four days. It appears that after receiving the order she found it necessary to make for the freight another copy, and instead of tracing from the original, as is required by the rules, she made a freehand copy, and did not repeat the order to the dispatcher a second time, as is required when a copy is made in any other manner than by tracing. Her reason for making a new copy was that the first one was not satisfactory. This woman had been instructed for several months in a school of telegraphy which had been established by the railroad company, and had also been tutored in the station at Lyons Falls by a regular operator for about one week. She passed a satisfactory examination before the chief train dispatcher.

The collision at St. Louis on the 14th was due to a misunderstanding of orders by a conductor and an engineman, both of whom had been in the service of the road over 28 years. Southbound trains Nos. 3, 9 and 17 had orders to take the northbound track at Oak Hill Junction, because of some trouble on the road near that point. The crew of No. 9—the Memphis Express—misunderstood orders and took the northbound track at Tower Grove. The line is known as the Oak Hill, and the mistake may have resulted from confusing Oak Hill line with Oak Hill Junction. The engineman of No. 9 was killed. The conductor, at the investigation, was unable to give any clear reason for the mistake. He said that he just got the impression that the course he took was the one prescribed in the order. The collision occurred at 8:15 p. m., between King's Highway and Morgan Ford road.

The derailment at Greenwich, Conn., on the 16th resulted in the death of one passenger and the injury of 13. The train was the White Mountain Express leaving New York at 8:40 a. m. for Springfield, and the reports indicate that it was running at regular speed. The train consisted of two electric locomotives and nine cars, occupied by about 175 passengers. All of the cars were derailed, but the most of the injuries were to persons in the sixth car, which was a parlor car. This car was overturned. It appears to have got outside of the guard rails just before crossing a bridge spanning a highway; and, with the three cars following, it crossed the bridge with the trucks sliding on the bridge girder. Both of the two motors were derailed. As the track at this point was in good condition, the rails being heavy (100 lbs. to the yard), and the ties all less than one year old, the cause of the derailment appears to have been due to some failure of or defect in the engines or cars; but thus far no clear explanation has been found. In the absence of more definite knowledge, inquiry has been directed to the behavior of the electric motors. These engines weigh 95 tons each and are only 36 ft. long. The body rests on two four-wheeled trucks, whose centers are only 14 ft. 6 in. apart. The rails which apparently first gave way were turned over and not pushed horizontally outward, as the

[1] Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc.——boiler, Explosion of boiler of locomotive on road——fire, Cars burned while running——P., or Pass., passenger train——F., or Ft., freight train (includes empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

first newspaper reports of "spread rails" would indicate. The spikes were not sheared off. The 41 electric motors running on this line are all of the same pattern and some of them have been running on the line for about one year. In experimental trips they have been run at high speed without causing unusual disturbance of the track. Some of them, however, have developed a more pronounced tendency to "nosing" or "hunting" than have others. It has been declared that the leading engine of this train had been particularly bad in this respect, but this the officers of the road deny.

The derailment of a passenger train (No. 13) at Marion, Ohio, on the 22nd, was due to the accidental misplacement of a switch in consequence of the derangement of the electric circuits at an interlocking plant. The switches in this plant just west of the station are worked by electric motors, which draw their power from the signal cabin by means of insulated wires. The reports say that two of these wires were so situated that a hot coal dropped from the locomotive of train No. 13 burned off the insulation of the wires in such a way as to allow them to come in contact with one another; and thus send a false current into the motor of the switch. By the time the engine and the first two cars of the train had passed the switch, the rails had been moved by the motor sufficiently to derail the next car which was an express car. Three cars, altogether, were derailed and one of them was overturned. The engineman happened to be looking back at the time the first car was derailed and quickly applied the brakes. Two men on the train were slightly injured.

---

Of the 12 electric-car accidents reported in the newspapers in the month of July, three were reported as resulting in fatal injuries. In one of these cases, in a collision near Johnstown, Pa., one person was killed outright, and 30 were injured. In this case a car, after colliding with another, ran back a half mile down grade and was then overturned. On one of the elevated railroads of Chicago a train crashed into the bumpers at the end of a line with disastrous results, although no person was killed. On the Ninth avenue elevated line in New York City there was a rear collision, but in this case one of the two trains was empty and the personal injuries were slight. Near Aurora, Ill., on the Aurora, Elgin & Chicago interurban line there was a butting collision of cars running at good speed; 40 persons reported injured.

---

## PICKED UP ON THE ROAD.

BY GULF.

It is frequently instructive to observe the way in which elaborate precautions for the operation of safety devices can be and are rendered a hollow mockery by the stupidity or recklessness of the persons charged with the responsibility of such operation. I have in mind an occurrence on a single-track railroad bridge over which trains were run by the electric train staff. On one occasion an engineman lost a staff. Of course, both instruments remained locked, and it was impossible to withdraw another staff from either. Under the rules the operators should have moved all trains by clearance cards, under authority from the despatcher, until a new staff could have been supplied. But it was too much trouble to write cards, and as the "master staff" was rather proud of the system and thought that the issuance of cards would bring it into disrepute with the enginemen, he sent a private report of the trouble to the repairman and continued to issue "staffs" to trains; these staffs consisted of the staff pouches, loaded with nails! Of course, a rule, if it could have been enforced requiring enginemen to open the pouches and assure themselves that they were really receiving staffs, would have prevented such a procedure on the part of the operators. But—and here is another point that will interest trainmasters and superintendents—could we be sure that enginemen would in such cases report all violations of the rules? This episode also illustrates the strength of the two influences, faith and habit. The enginemen had been told that they would receive authority to proceed on the bridge, in the form of a staff in a case, and they accepted a staff case full of nails. So far as I have been able to learn, not one of them had ever actually seen a staff. Perhaps some psychologist will be able to explain why no engineman ever opened a case out of curiosity, especially as his life might depend on the presence of a staff within.

---

## RECENT NARROW GAGE LOCOMOTIVES FOR HEAVY SERVICE.

During the past few years the attention of locomotive builders has been confined principally to the development of heavy standard gage power. At the same time, the capacity of many recent narrow gage locomotives shows a marked advance over that of similar engines built a few years ago, and the tendency to construct as powerful locomotives as physical conditions and limitations will permit, is evidenced in many narrow gage designs.

The accompanying illustrations represent three locomotives recently built by the Baldwin Locomotive Works, and possessing features of interest. The track gage in each case is 3 ft. A description of these locomotives follows:

*Four-Coupled Locomotive. Illinois Steel Company.* This engine is intended for heavy switching service, and was designed for heighth and width limits of 11 ft. and 7 ft. 1 in., respectively. The total weight in working order is 92,390 lbs., hence the average weight per wheel is about 23,000 lbs. The tractive force is 21,050 lbs., thus giving a ratio of adhesion of approximately 4.4.

The springs of this locomotive are not connected by side equalizing beams, but the engine is cross equalized in front, so that all the wheels readily find a bearing when running over uneven track. The frames are of cast steel, and are made in the form of slabs back of the rear driving-pedestals. Further cast steel details include crossheads, driving-wheel centers, driving boxes, foot plate and front bumper. A radial draw bar is provided at each end. The draw heads are cast steel of the three pocket type, with link and pin couplers.

The Laird form of guide is used on this engine. The connecting and coupling rods are rectangular in section, the connecting rods having forked end stubs at the back, while the coupling rods have solid end stubs. The slide valves are balanced and the valve motion is of the Stephenson type.

The boiler is of the straight top, radial stay type, with two rings in the barrel. The fire box overhangs the rear frames on either side, and the mud ring is carried on sliding supports at the front and back. The boiler carries a saddle tank, which is extended to the smoke box front in order to gain capacity.

The fittings include a steam brake which operates on all driving-wheels. Front and back sand boxes are provided, and the bell is placed on the front bumper.

This is a powerful locomotive for its type, equalling, in weight and tractive force, many standard gage engines. It is simple in construction, with ample strength in all parts, and is well fitted to withstand the severe service to which such locomotives are usually subjected.

*Prairie Type Locomotive. East Broad Top Railroad & Coal Co.* This locomotive is suitable for either passenger or freight service. It operates on a line having curves of 17°, and for work of this character the 2-6-2 wheel arrangement, with a radial truck at each end, is conveniently employed. The maximum tractive force is 15,950 lbs., and as the weight on driving-wheels is 66,180 lbs., the ratio of adhesion is 4.15.

Owing to the compact grouping of the driving-wheels in this locomotive, it is necesary, in order to secure a main rod of sufficient length, to connect the same to the rear pair of

wheels, which is a rather unusual arrangement in an engine of this type. The Walschaerts valve gear is applied, and the most suitable location for the link is outside the second pair of driving-wheels. The link is of the built up type, with cast steel side plates. It is supported by two steel castings, which are bolted to the guide yoke in front, and at the rear to a suitable bearer. The link trunnions are seated in bronze bushings. The combining lever is placed back of the cross-head and is coupled directly to the valve rod, so that all parts of the gear are placed in practically one plane. The valves are set with a constant lead of 3/16 in. The Laird design of guide is used, and the bars are of wrought iron, case hardened. The cross-heads are of cast steel.

The main frames and rear sections are of cast steel, while the double front rails are of wrought iron. The first pair of driving wheels is equalized with the leading truck, while the second and third pairs are equalized with the rear truck, which is of the Rushton design with inside journals. The driving springs are placed over the boxes, and the rear end of the engine is carried on each side by an inverted leaf spring. The absence of any valve motion between the frames allows ample room for two large air drums, while an additional drum is hung under each cab board.

The boiler is of the straight top type, with wide fire box. The crown and sides of the inside shell are in separate pieces, while in the case of the outside shell the top and sides are in one sheet. The staying is radial, with one ⊥ bar at the forward end of the crown. This fire box is fitted with a short combustion chamber, or D-head. The fire-door is 16 in. diam. and the opening is formed by flanging both sheets outward. The mud ring is supported on a buckle plate at each end. The grate is composed of rocking bars, with drop plates front and back.

The boiler barrel is built with two rings. The dome is placed on the second ring, which has a butt jointed seam on the top center line. The seam is welded under the dome base.

The tender frame is built of 8 in. steel channels. The trucks are of the arch bar type, with double elliptic springs and cast steel bolsters. The wheels are steel tired with cast iron spoke centers, and were supplied by the Standard Steel Works Company.

This locomotive possesses all the characteristics of the Prairie type as usually designed for standard gage lines. The boiler capacity is high in proportion to the tractive force, and the design throughout is admirably adapted to the service required.

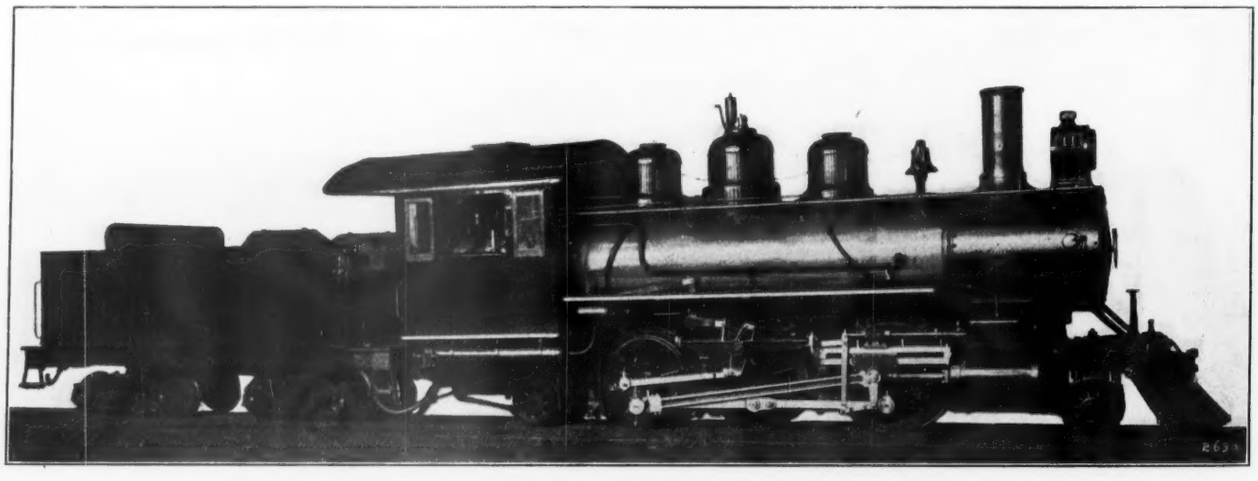
*Consolidation Type Locomotive. White Pass & Yukon Route.* Apart from its constructive details, this engine is notable as one of the heaviest 3-ft. gage locomotives thus far completed by the builders. It is intended for service on a line having grades of 3.9 per cent. and 20° curves, and develops a tractive force of 31,400 pounds. The design includes a smoke box superheater and an interesting application of the Walschaerts valve motion.

In order to provide increased stability, the fames of this locomotive are placed outside the wheels. The rear sections, which are in the form of slabs, are bolted to the main frames back of the rear driving pedestals. The firebox is placed behind the driving wheels and between the frames, thus giving


Narrow Gage Switcher; Illinois Steel Co.

room for a deep and wide furnace, and providing sufficient grate area without any excessive overhang at the rear end.

The leading truck is provided with outside journals, and is equalized with the first and second pairs of driving-wheels. The spring rigging is simple in arrangement, as all the driving springs are placed over the boxes. The driving wheel centers are of cast steel, and the boxes are of steeled cast iron. The location of the frames necessitates the use of outside cranks, which are of steel, cast in one piece with balance weights. On the first and fourth pairs of driving-wheels these weights are cast solid, while on the second and third pairs they are cored out and filled with lead.



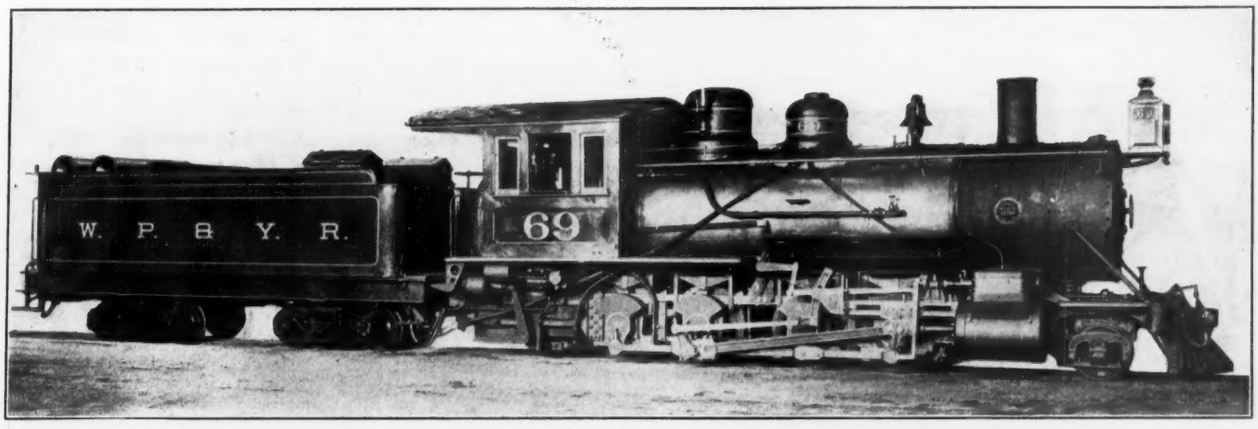
Narrow Gage Locomotive; East Broad Top Railroad & Coal Co.

The most interesting detail of the valve motion is the link. This is a new design, and application has been made for a patent covering the same. It is built up of four steel castings, viz.—two side plates and two filling pieces. Each side plate is cast in one piece with its trunnion, while the lower filling piece is provided with an arm to which the eccentric rod is attached. The link block is of hard bronze and is made in two pieces. It is guided in the link by projecting lips which bear against the edges of the side plates. The two sections of the block are held together by means of lugs which are circular in section and fit one within the other, the larger being drilled out to receive the smaller. The larger

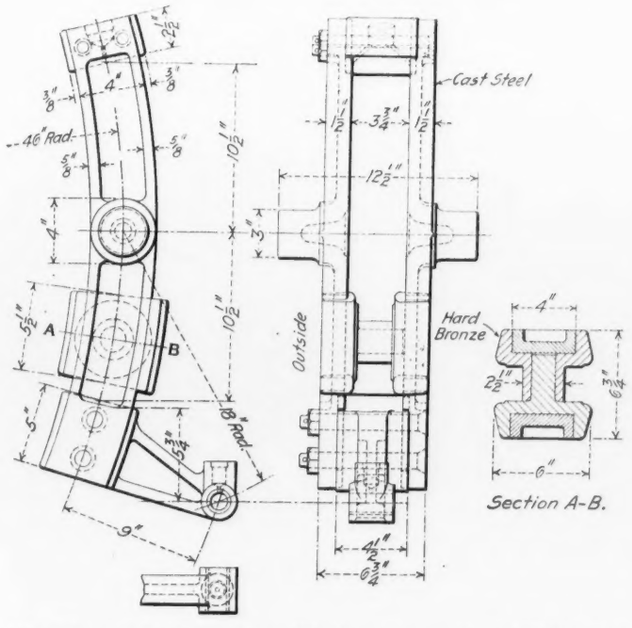
lug constitutes a pin which is embraced by the radius rod. The latter passes between the side plates and is suspended at its rear end.

The link bearing is of cast steel, and is bolted to the back of the guide yoke. The link, link block and radius rod are all assembled in the bearing. The link is driven by a cast steel return crank which is clamped to the main pin and further held in place by a through bolt. The upper end of the combining lever is connected directly to the valve stem, thus placing all parts of the gear in practically one plane. The reverse shaft is placed between the second and third pairs of driving wheels. The valves are set with a lead of ¼ in. and a maximum travel of 5¼ in.

The boiler is of the straight top, radial stay type, with two rings in the barrel. The crown and roof sheets slope toward the rear, and the front end of the crown is supported by one




Narrow Gage Prairie Locomotive; White Pass & Yukon.



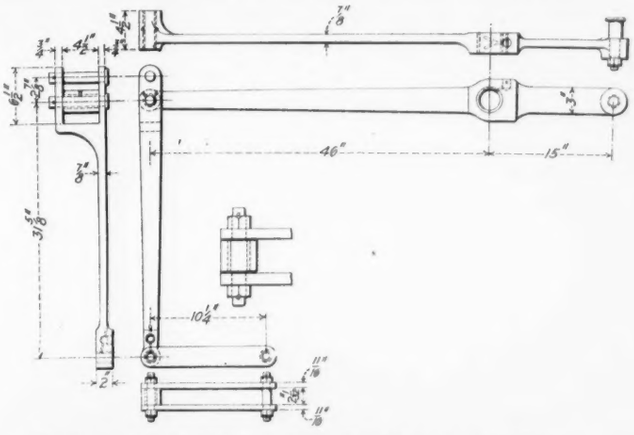

Walschaerts Link for Consolidation Locomotive; White Pass & Yukon.

⊥ bar hung on sling stays. The firebox is carried on each side, by two expansion bearers which rest on the frames. The grate rocks in one section, and has a drop plate in front. A brick arch is provided and it is supported on studs which are screwed into the side sheets.

The superheater calls for no special comment. It is of the smoke box type as developed by the Baldwin Locomotive Works, and is similar in general design to the several examples which have been previously described and illustrated.

The tender frame is built of oak and yellow pine, and carries a U-shaped tank. The trucks are equipped with arch bar frames, double elliptic springs, cast steel bolsters and chilled cast iron wheels.

The tractive force exerted by this locomotive is equal to that of many standard gage engines in road service, and the




Radius and Combining Rods for Walschaerts Gear.

design probably represents the limit of capacity attainable in an eight-coupled locomotive on a line laid with 56-lb. rails.

| | Consolidation | Prairie. | Four-wheel switcher. |
|---|---|---|---|
| Gage | 3 ft. | 3 ft. | 3 ft. |
| Cylinder diameter | 21 in. | 16 in. | 17 in. |
| Piston stroke | 22 " | 22 " | 20 " |
| Boiler diameter | 66 " | 52 " | 52 " |
| Boiler, thickness of sheets | 5/8 " | 1/2 " | 9/16 " |
| Steam pressure | 160 lbs. | 160 lbs. | 180 lbs. |
| Fuel | Soft coal. | Soft coal. | Soft coal. |
| Firebox length | 59 15/16 in. | 71 11/16 in. | 46 1/8 in. |
| " width | 51 in. | 48 3/4 in. | 49 3/4 in. |
| " depth front | 66 1/2 in. | 46 5/8 " | 57 3/4 " |
| " depth back | 60 " | 45 " | 57 7/8 " |
| " thickness, sides & back | 5/16 " | 5/16 " | 5/16 " |
| " " crown | 3/8 " | 5/8 " | 3/8 " |
| " " tube sheet | 1/2 " | 1/2 " | 1/2 " |
| Water space front | 3 1/2 " | 3 1/2 " | 3 1/2 " |
| Water space sides & back | 3 " | 3 " | 3 " |
| Tubes, material | Iron. | Steel. | Iron. |
| " thickness | 12 W. G. | 11 W. G. | 12 W. G. |
| " number | 182 | 152 | 158 |
| " diameter | 2 1/4 in. | 2 in. | 2 in. |
| " length | 16 ft. 6 in. | 13 ft. 6 in. | 10 ft. 10 in. |
| Heating surface, firebox | 100.0 sq. ft. | 91.8 sq. ft. | 79.5 sq. ft. |
| " " tubes | 1,760.0 " | 1,066.7 " | 889.0 " |
| " " total | 1,860.0 " | 1,158.5 " | 968.5 " |
| Grate area | 21.2 " | 24.0 " | 16.0 " |
| Wheels, diam., driving | 42 in. | 48 in. | 42 in. |
| " " front truck | 26 " | 24 " | ..... |
| " " rear truck | ..... | 24 " | ..... |
| " " tender | 26 in. | 24 " | ..... |
| Journals, driving | 8 in. x 8 in. | 7 in. x 7 in. | 8½ in. x 9 in. |
| " truck | 4¼ in. x 8 in. | 4 in. x 7 in. | ..... |
| " tender | 4¼ in. x 8 in. | 3¾ in. x 7 in. | ..... |
| Wheelbase, driving | 12 ft. 0 in. | 9 ft. 6 in. | 5 ft. 9 in. |
| " total engine | 19 ft. 10 in. | 21 ft. 6 in. | 5 ft. 9 in. |
| " engine & tender | 48 ft. 11 in. | 44 ft. 4 in. | ..... |

| | Consolidation | Prairie. | Four-wheel switcher. |
|---|---|---|---|
| Weight on drivers | 119,810 lbs. | 66,180 lbs. | 92,390 lbs. |
| " " front truck | 14,550 " | 10,000 " | ..... |
| " " rear truck | ..... | 13,600 " | ..... |
| " total engine | 134,360 lbs. | 89,780 " | 92,390 lbs. |
| " engine and fender | 215,000 " | 140,000 " | ..... |
| Tank capacity, water | 4,000 gals. | 2,500 gals. | 1,500 gals. |
| Tank capacity, coal | 4½ tons. | 5 tons. | ..... |
| Service | Freight. | Freight. | Switching. |
| Superheater | Baldwin. | ..... | ..... |
| Tractive effort | 31,400 lbs. | 15,950 lbs. | 21,050 lbs. |
| Weight on drivers / Tractive effort | 3.82 | 4.15 | 4.39 |
| Total weight / Tractive effort | 4.28 | 5.63 | 4.39 |
| Tractive eff. x diam. drivers / Heating surface | 709.03 | 660.85 | 912.85 |
| Heating surface / Grate area | 87.73 | 48.19 | 60.53 |
| Firebox heating surface / Total heating surface | 5.37* | 7.92* | 8.21* |
| Weight on drivers / Total heating surface | 64.41 | 57.13 | 95.39 |
| Total weight / Total heating surface | 72.23 | 77.50 | 95.39 |
| Displacement of 2 cylinders | 8.82 | 5.12 | 5.16 |
| Total heating surface / Displacement 2 cylinders | 210.88 | 226.27 | 187.69 |
| Grate area / Displacement 2 cylinders | 2.40 | 4.68 | 3.10 |

*Per cent.

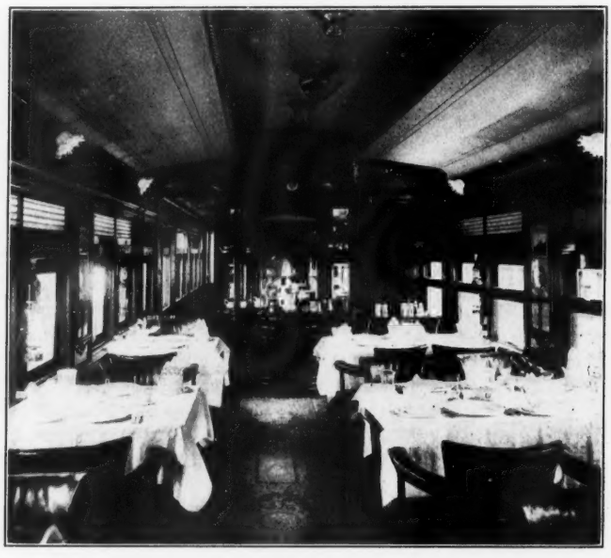
## GREAT INDIAN PENINSULA TOURISTS' TRAIN.

The irresistible around-the-world tourist having over-run Egypt and the near Orient now includes India in his itinerary of travel and to mitigate the inconveniences due to the deficiency of good European hotel accommodation in the cities of Upper India the Great Indian Peninsula Railway has built a handsome "train de luxe" equipped with the latest of modern comforts. It is made up of vestibuled cars of the latest design and adapted for comfortable travel in a tropical climate. The compartments are more spacious than those in English or American cars, full advantage having been taken of the broad gage.

Schedules have been arranged so that visitors to India using this train will generally leave one center for another in the evening, about the dinner hour, that being the most convenient and pleasant time to travel. The sleeping cars are built on the corridor principle with transverse berths arranged in rooms suitable for two or four occupants, each room having an electric fan and an electric light with ample provision for hand baggage.

The front vehicle of the train is a combination car in which passengers' personal baggage is stored in cloak rooms under the care of the conductor. It contains also compartments for the accommodation of the private servants of guests, a fully equipped bath room, and a series of private dressing rooms. These latter are beautifully finished with tiled floors and enameled walls.

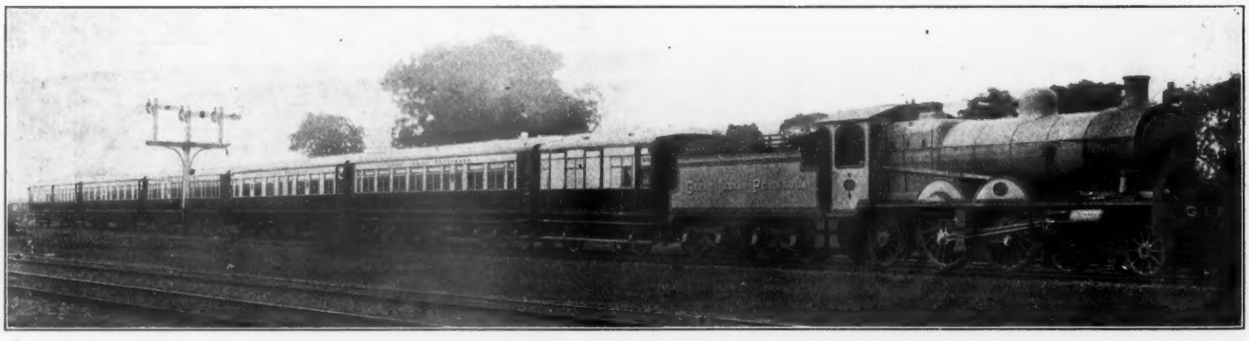
There is in the train a parlor car which furnishes a comfortable smoking lounge, and a dainty ladies' boudoir. It has a well equipped buffet and includes a pianola and a library among its attractions. Adjacent to this car is the restaurant car in which 40 persons can dine at once. The kitchen has a gas cooker and for ventilation an electric exhaust fan is fitted in the roof. Filtered water in unlimited quantity is procurable from a pressure filter and all the appointments are like those of a high class hotel. The provisions and ice are carried in a store van or "tender" adjacent.



Great Indian Peninsula Restaurant Car.

All the cars forming this luxurious train have unique arrangements for ventilation and are built with double roofs and sides with a layer of heat resisting, or non-conducting packing between. The fittings and upholstery have been specially selected for Indian requirements. Dust screens are fitted to all the windows, as well as Venetian sun blinds. A telephone system has been installed throughout the train.

The cars for this train, shown in the accompanying illustration, were built at the company's shops at Parel, Bombay, under the direction of A. M. Bell, carriage and wagon superintendent. They have Pullman vestibules, Buckeye couplers, and the high speed vacuum brake.



Tourists' Train; Great Indian Peninsula Railway.

## SOUTHERN PACIFIC SUBURBAN DEPOT AT BERKELEY.

The new passenger station recently completed at Berkeley, Cal., is one of the best arranged and most artistically designed suburban stations on the Southern Pacific system. The scheme brought out by competition for the University of California, of which M. Bernard, of Paris, a well-known architect, was the successful competitor, gave the idea for this station. The architect's object was to produce a building of a suburban character to meet the requirements of a college town in which it is necessary at times to handle crowds of students who do not enter the building proper, but require a covered protection while awaiting their train.

The structure is composed of two separate buildings, which are connected on the track side with a wide arcade. This continues across the opposite ends of the two buildings, making a long covered outdoor waiting room. The two buildings are separated by a court, laid off with circular walks and grass plots, in the center of which a flagstaff is placed, giving a well-defined feature for the center of this court. On the opposite of this open space the two buildings are joined with a screen wall having a semi-circular entrance in the center; the two panels on each side are filled with iron grill work.

New Southern Pacific Station at Berkeley, Cal.

The entire structure is 189 ft. long by 41 ft. wide and one story high, with walls, made of solid brick, while the water table, all belt courses, quoins around openings, etc., are finished in natural cement colored stucco. The facing of the exterior is of red pressed brick laid with white joints. The arcade columns are made of reinforced concrete and finished like the stucco work. All caps, keys, or ornamental work are of cast cement stone built into the walls during their construction. The cornices and balustrades are of galvanized iron. The roof is covered with a dark gray slate.

In one building is the general waiting room and ticket office.

Entrance; Berkeley Station.

Waiting Room; Berkeley Station.

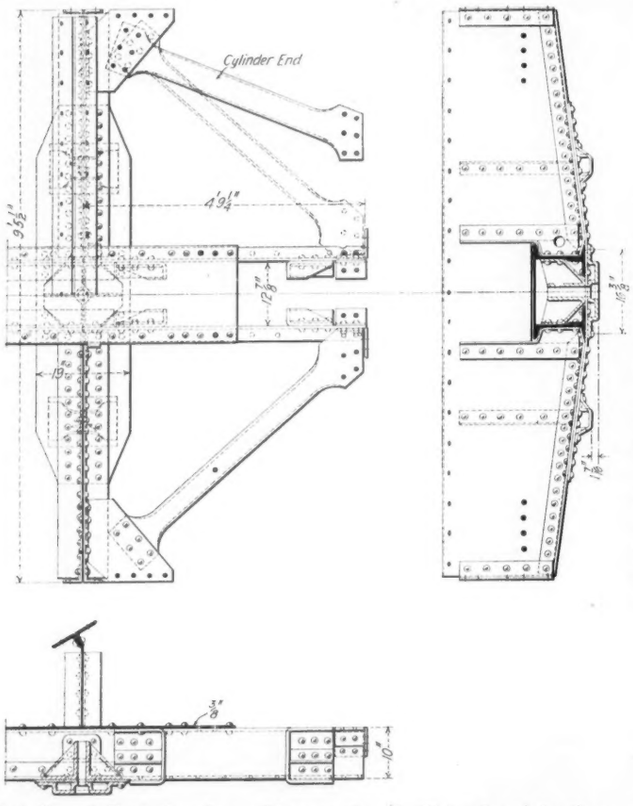
while in the other is a smoking room for students and a baggage room. The interior of the waiting room is finished in keeping with the exterior, with tile floor and wainscot and beamed ceiling. In one end of this room is a large open fire place faced with square terra cotta tile, while above the mantel is a panel modeled in low relief. This represents a football game and is a fine vigorous piece of work by George M. Cumming, of the Southern Pacific.

The building is heated with hot water from a boiler in the baggage room. The grounds on one side are enclosed with an iron fence and are laid out in walks and drives and grass plots.

This building was designed by J. D. Patterson, architect of the company, and built under the direction of J. H. Wallace, assistant chief engineer.

## END BRACING FOR GONDOLA CAR.

In the issue of June 12 there was a description of the cars used on the Virginia coal roads; among them the gondola of the Chesapeake & Ohio. These cars are of steel and are very strongly braced in order to sustain the longitudinal stresses to which they are subjected. The engravings of the plans




**Details of End Bracing; Chesapeake & Ohio Gondola Car.**

shown herewith give a clear idea of this construction. In the first place, the body bolster is a stiff plate girder of ample depth to carry any load that may be put upon it, and is stiffened longitudinally by broad cover plates. From the ends of the center sills a pressed stel diagonal brace runs out to the end of the bolster, where it is riveted to a broad gusset that is fastened both to the side sills and to the bolster. In addition to this, there is a second diagonal running out to the end sill midway between the center sill and the side of the car, so that great rigidity is obtained.

The Austrian and also the Hungarian State Railroads are making experiments with railroad sleepers of reinforced concrete. So far as the trials have gone, they are said to be satisfactory.

## POWER REQUIREMENTS OF RAILROAD SHOP TOOLS.*

BY L. R. POMEROY.

Generally speaking, for railroad repair shops, the generator capacity approximately equals 15 k.w. per locomotive pit, or space in erecting shop occupied by one locomotive. This comprehends requirements for tools, cranes, heating, blower and exhaust fans, i.e., provides for all power required except lighting.

The tools alone require about 9 to 10 k.w. per pit; heating, blower and exhaust fans 5 k.w. per pit, while 3 k.w. per pit will care for the ordinary shop and adjacent yard lighting.

The following curves, Figs. 1 to 8, are submitted to cover the general horse-power requirements of machine tools ordinarily found in railroad repair shops.

Occasionally certain tools are selected with the purpose of performing extra heavy service, to utilize the full capacity of the new rapid cutting tool steel, as is now done in manufacturing shops; in such cases the power to drive must be figured on the basis of service required of the machine. As these cases are few and exceptional the curves meet the majority of conditions, but the exceptions can be taken care of by the following formula:

Horse-power to drive equals FxDx (f.p.m.) x12xNxC., where

F = Feed in inches.
D = Depth of cut in inches.
(f.p.m.) = Feet per minute.
N = Number of tools cutting.
C = A constant depending on the class of material, with the following values:

| | |
|---|---|
| For cast iron | 0.35 to 0.5 |
| Soft steel or wrought iron | 0.45 to 0.7 |
| Loc. driving wheel tires | 0.70 to 1.00 |
| Very hard steel, i.e. crucible steel driving wheel tires | 1.00 to 1.10 |

This formula is based on Prof. Flather's dynamometer tests which check up fairly with actual motor tests, and is, therefore, submitted with confidence.

For example: The aggregate horse-power of 45 tests, with various tools, by test was 247.7, while the calculated aggregate horse-power by formula equaled 247.2.

The extensive tests made by Dr. Nicolson, of the Manchester Technical School, England, confirms the foregoing, and is a very interesting contribution to the subject. A careful analysis of the results of these experiments show the average horse-power required at the motor, per pound of metal removed per minute to be as follows:

| | |
|---|---|
| Medium or soft steel or wrought iron | 2.4 h.p. |
| Hard steel | 2.65 h.p. |
| Cast iron, soft or medium | 1.00 h.p. |
| Cast iron, hard | 1.36 h.p. |

Using the symbols of the previous formula the horse-power becomes: F x D x (f.p.m.) x 12 x N x W x figures above, where W equals the weight of a cubic inch of metal removed and is as follows: For cast iron 0.258; wrought iron 0.278; for steel 0.284.

The following examples illustrate more or less heavy cuts to which reference has been made; the larger powers given are exceptional, while the average requirements are far below these, and all are submitted as actual cases which have come under the writer's observation:

(a)—100 in. driving wheel lathe—(material steel d.w. tires).
$\frac{5}{16}$ in. feed ($\frac{5}{16}$ in. cut) at 18.5 f.p.m. (two tools cutting).
$\frac{5}{16}$ in. x $\frac{5}{16}$ in. x 18.5 ft. x 12 x 2 x C. = 40 h.p.
Same lathe $\frac{3}{16}$ in. feed (¼ in. cut) at 16 f.p.m. (two tools cutting).
$\frac{3}{16}$ in. x ¼ in. x 16 ft. x 12 x 2 x C. = 16 h.p.

*Abstract of appendix to a paper on "High-Speed Tool Steel," presented at meeting of the Central Railway Club, Buffalo, N. Y., May 8, 1908.

(b)—Old 76 in. driving wheel lathe (material d.w. tires).
1/16 in. x 1/4 in. x 16 ft. x 12 x 2 x C. = 5 h.p.

(c)—Steel tired wheel lathe (engine truck wheels).
1/7 in. x 5/16 in. x 16 ft. x 12 x 2 x C. = 17 h.p.

(d)—Planer (material cast iron)
5/32 in. x 3/8 in. x 16 ft. x 12 x 0.35 (one tool cutting) = 4.5 h.p. (two tools cutting) = 9 h.p.

(e)—Planer (wrought iron engine frame).
5/32 in. x 1/2 in. x 16 ft. x 12 x 2 x .5 (two tools cutting) = 15 h.p.

(f)—76 in. boring mill (on cast steel d.w. centers).
1/8 in. x 3/4 in. x 30 ft. x 12 x 3 x 45 (two tools cutting) = 45 h.p.

Same machine boring driving wheel tire.
1/8 in. x 3/16 in. x 28 ft. x 12 x 2 x 1 (two tools cutting) = 15 h.p.

(g)—84-in. boring mill (on 62-in. cast iron wheel centers).
1/8 in. x 1/10 in. x 30 ft. x 12 x 3 x 0.35 (three tools cutting) = 4.7 h.p.

Same mill boring 44-in. steel tire.
1/4 in. x 3/32 in. x 26 ft. x 12 x 2 x 1 (two tools cutting) = 14.5 h.p.

(h)—A special test on an extra heavy driving wheel lathe, giving results representing unusual conditions, where the operator was given a heavy bonus to develop the ultimate capacity of the machine, is as follows:

Average feed 0.4625 in. x depth 0.423 at 12.2 f.p.m. (two tools cutting).

The foregoing figures are the averages of 37 tests and represent 40 h.p. The maximum horse-power developed was about 65. The machine is equipped with a 40 h.p., d.c. motor with 2.1 speed variation.

The lathe in question is a "special," extra heavy and about double the capacity and cost of the standard driving wheel lathe of equivalent size. On average work the same investment in two lathes will turn out more work in a year than this special machine.

For rapid estimates, where the foregoing data is not avail-

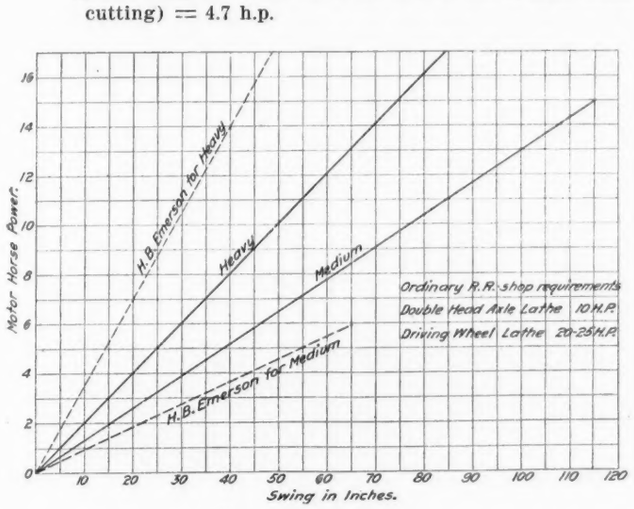



*Fig. 1.—Lathe Motors.*

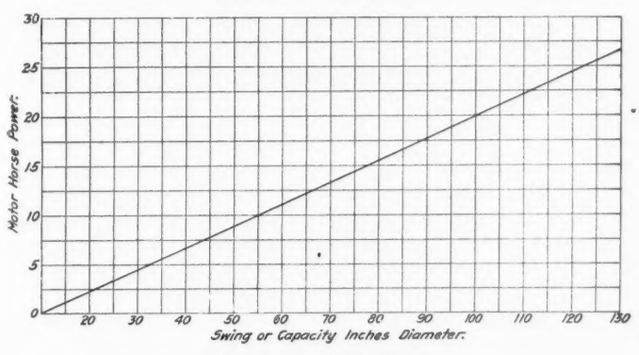



*Fig. 5.—Boring Mills.*

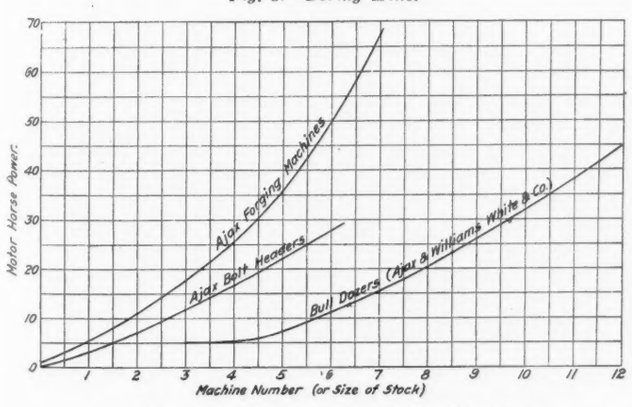



*Fig. 7.—Forging and Bolt Heading Machines.*

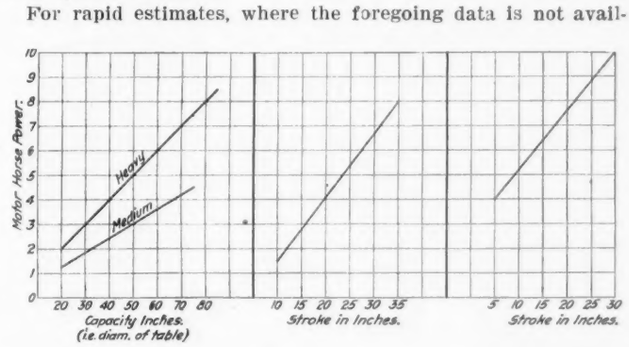



*Fig. 2.—Drill Press.* *Fig. 3.—Shaper.* *Fig. 4.—Slotter.*

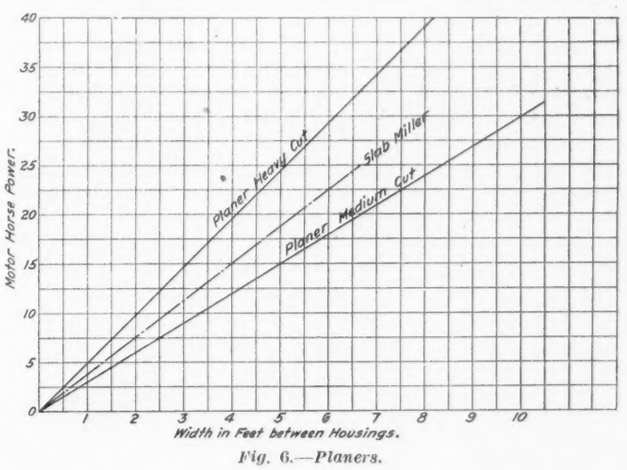



*Fig. 6.—Planers.*

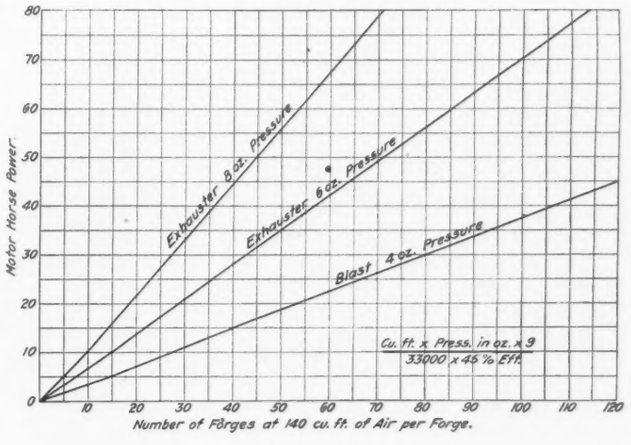



*Fig. 8.—Fans.*

**Horse Power Requirements of Machine Tools.**

able, the horse-power required can be obtained by the following formula:

(a.) $$\text{horse-power} = \frac{\text{d in.} \times \text{f} \times (\text{r.p.m.})}{12 \times 400}$$ (single belt), where

d = Diameter of smaller pulley in inches.
f = Face of pulley in inches.
r.p.m. = Revolutions per minute.

(b.) $$\text{horse-power} = \frac{\text{d in.} \times \text{f} \times (\text{r.p.m.})}{12 \times 400 \times 0.7}$$ (double belt).

This formula is very conservative and provides for about as much overload capacity for belts as is ordinarily assumed for motors; it considers a liberal allowance for the influence of centrifugal force and diminishing arc of contact of pulley figured, driven from a larger one.

It is especially useful in figuring power required for woodworking machines and was arrived at largely from experience with such machines.

The tool builders do not always discriminate between the requirements of manufacturing plants and railroad repair shops and for this reason motors are often recommended that are larger than necessary. For example—the *finished* product of the axle departments of such concerns as the United States Steel, Midvale, Bethlehem and Cambria companies becomes the *raw* material for railroad shops. In the former case, the forging is turned out from the hammer without much regard to finished dimensions, as it is much cheaper to rough out to size on special rapid reduction lathes than to attempt to reduce the size under the hammer.

For such machining high power is required, but for same lathes for railroad shops, when the work performed is finishing on journals and wheel seats, mainly finishing cuts, a smaller and cheaper motor can be selected.

As an example of extreme requirements, as mentioned, the Bement-Niles lathe furnished the Howard Axle Works is given. The capacity of this machine is two cuts each ⅝ in. x ⅛ in. at 60 ft. per minute and at this rate of cutting will require a 60 h.p. motor.

Another machine built for same work used largely in axle shops and in many railroad shops is capable of taking two cuts of ¾ in. x $^1/_{12}$ in. at 24 ft. per minute requiring 18 h.p. and is usually furnished with a 20 h.p. motor.

While this power is all right for full capacity of machine, 10 h.p. will cover the requirements of same tool on average railroad shop work.

## MANILA RAILWAY.

The accompanying photographs were taken along the line of the Manila Railway, on the Island of Cebu. J. G. White & Co. are building about 300 miles of line in the Philippines, using native labor with some Chinese and Japanese labor. The chief difficulties of construction are very heavy rainfalls, which amount to a flood in a few hours. There is comparatively little cut and fill work, the country being mainly low or slightly undulating. The greatest population live in the

Laying Rail.

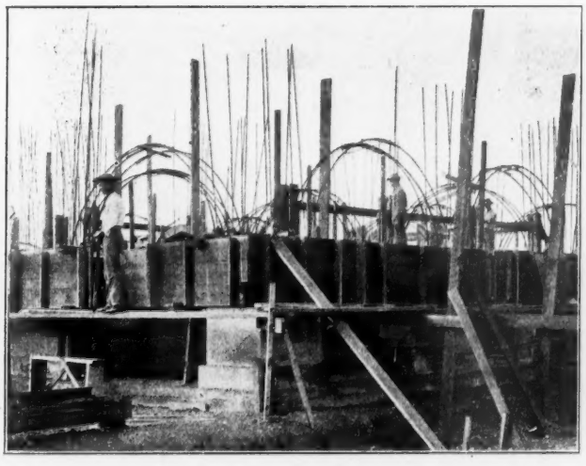
Construction of Naga Station.

Naga Station; Second Class.

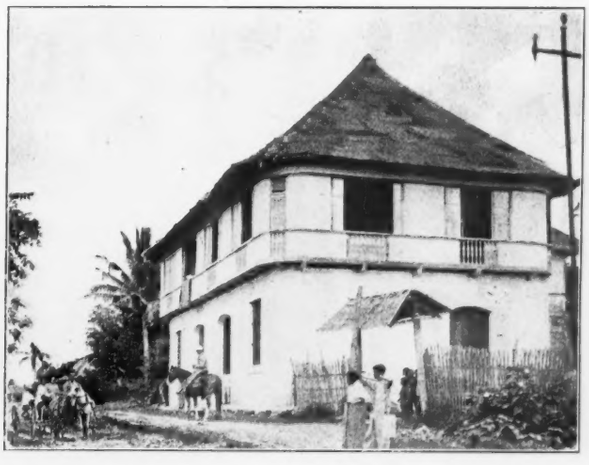
Temporary Second Class Coaches.

Completed Track.

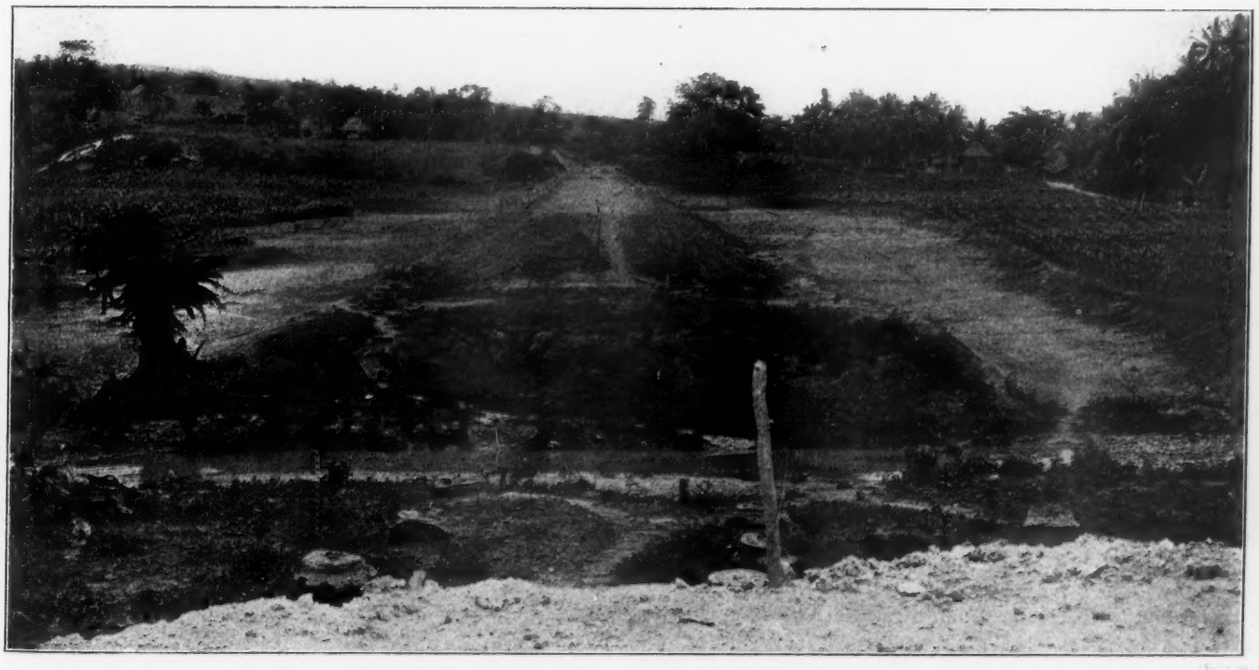
Ballast Train.



Construction of Cebu Station.



Mess House at Sangot.



Grade Through the Lowlands; Island of Cebu.

Visayan group of islands, including Panay and Cebu. In Cebu there is a population of 350 per square mile along the route of the railroad which is being built. The island grows corn, rice, hemp, fruit and vegetables, and, also, has extensive coal deposits quite close to one of the terminals of the new railroad project. There is also an abundance of material available near the line for Portland cement. It is quite within the range of possibility that coal can be successfully mined in Cebu and cement manufactured for building the railroad so that it will not have to be imported. As laborers the Filipinos differ widely in different localities; in the Island of Cebu, with its thickly populated districts, it is more necessary for a native to work in order to live, and labor, therefore, is more plentiful. The engineers of the railroad have found trouble in persuading laborers to travel any distance to work in new localities. The natives are extremely childlike and improvident, but learn to handle mechanical tools quickly, and if trained right, and long enough, become very good laborers. The general type of country through which the road runs is well shown in the photograph of the grading through the lowlands.

## RAILROAD REORGANIZATION IN ITALY.

The new act dated July 7, 1907, dealing with the organizations of the state management of railroads in Italy, for which concessions have not been granted to private companies, does not repeal the act of April 22, 1905, except in cases where the provisions of the new act are in direct opposition to those in the act of 1905. The state will operate directly, through an autonomous administration, the railroads it has built or repurchased—the lines for which concessions have been granted to private concerns and which it is bound by former acts to operate, and the lines the concessions for which have lapsed, as well as the boat service across the strait of Messina.

The administration of the state railroads is subject to the control of the minister of public works and an administrative council and general manager are placed at the head of the operating force, members of the council and the general manager to be appointed by royal decree on the nomination of the minister of public works, with the consent of the council of ministers. The administrative council of the railroads consists of the manager, as president, and eight members, two selected from the higher railroad officers, three from the higher state officials and three from citizens, non-officials. This administrative council has general supervision of the operation of the roads, and must approve proposed work on the line or purchases of over 50,000 lire ($10,000). The general offices of the railroad are at Rome. Members of the administrative council and the general manager are responsible to the state for any losses resulting from a breach of laws or from gross negligence.

In the general manager's annual report receipts are to be divided into ordinary and extraordinary. The ordinary receipts include revenue from transportation and from the use of real property. The extraordinary receipts include sums contributed by the treasurer for extraordinary expenditure and repayments and subsidies paid by concessionary companies, and the proceeds of the sale of real property or old material The expenses are to be divided into ordinary working expenses, additional and supplementary expenses and extraordinary expenses. The first division includes all the operating expenses proper of the railroad. The supplemental expenses include extraordinary maintenance charges and the sums which, in accordance with the budget law, may be spent each year for improvements to the property. The additional expenses include interest on the value of the rolling stock and capital handed over to the administration from July 1, 1905, on and in general all interest charges and rentals. The extraordinary expenses include new construction and the cost of new rolling stock, which sums are supplied by the government. There is also a reserve fund for unforeseen expenditures formed by an annual charge of 2 per cent. deducted from gross receipts.

The general manager is instructed to favor national manufactures and home industries in awarding contracts. Reductions in tariffs must be by royal decree on the proposal of the minister of public works, with the approval of the ministers of the treasury, agriculture, of industry and of commerce, the general traffic council of the railroad agreeing. After a year's trial Parliament will make the royal decree law. Tariffs, however, can be raised only by an act of Parliament. Temporary reductions for definite quantities of goods from definite points to definite destinations may be authorized by the general manager after the administrative council reports in favor thereof. Equality of rates and service are to be granted to everyone under equal conditions. Every five years a general revision of the classifications of goods is to be undertaken.

A line is to be operated with three passenger trains daily in each direction if the gross receipts from passenger and quick freight service do not exceed 9,000 lire per kilometer ($2,900 per mile). When the gross receipts exceed this sum and are less than 12,000 lire per kilometer ($3,860 per mile), a fourth passenger train is to be run in both directions. When the gross receipts exceed 12,000 lire per kilometer, other daily passenger trains may be run. But in cases where the passenger trains are hauled by electric traction or motor cars exclusively, these rules do not apply, and the daily number of trains is in proportion to the number of passengers, provided the daily number of trains is not below the number specified in the rules.

All employees of the railroads operated by the state are considered public servants, which makes the penalty for going on strike severe.

A general traffic council is provided for, consisting of the minister of public works as president, the general manager as vice-president, three of the higher officers of the railroad nominated by the administrative council and other citizens, among whom is to be a representative of the Italian Press Association and representatives from the local consulting commissions and representatives of the two most important shipping companies in Italy. This general traffic council is merely an advisory board. The local consulting commissions are made up of two local officers of the road, four local representatives of industry, commerce and agriculture, and two members selected by the minister of public works from the citizens not in the railroad service. The roads, although directly operated by the government, are not exempt from the duties and penalties of common carriers.

## UNIT COSTS OF RAILROAD BUILDING.

The Alaska Central runs from Seward, a deep water port on Resurrection bay, which is about in the center of the south coast of Alaska, north toward Fairbanks, on the Tanana river. The road is standard gage, laid with 65-lb. rails. The maximum grade is 1 per cent., except over two mountain ranges, where it is 2.2 per cent. The maximum curvature is 14 degs. The cuts and fills are heavy and there are seven tunnels and many trestle bridges. The accompanying photograph, taken in the Placer River Valley, showing the railroad in the middle distance, gives a striking idea of the mountainous country through which the road runs. The other photograph shows the character of road bed and rolling stock.

The cost of 54 miles of road was $3,230,000. This includes cost of organization, but not cost of rolling stock, station buildings, docks, office fixtures, etc. The cost of separate sections, starting from the terminus at Seward, was as follows:

| | | | |
|---|---|---|---|
| 7 | miles at | $20,000 | $140,000 |
| 9 | " " | 40,000 | 360,000 |
| 18 | " " | 55,000 | 990,000 |
| 7 | " " | 35,000 | 245,000 |
| 5 | " " | 80,000 | 400,000 |
| 2 | " " | 50,000 | 100,000 |
| 4 | " " | 100,000 | 400,000 |
| 2/3 | " | tunnels | 300,000 |
| 1 2/3 | " | approaches | 295,000 |

The cost per mile of the above 54 miles was $60,000. De-

North Bound Special; Alaska Central.

Placer River Valley; Alaska Central.

ducting the 2 1-3 miles of tunnels and approaches, the cost per mile of 52 miles was $51,000. The 2-3 of a mile of tunnels cost at the rate of $450,000 a mile, and 1 2-3 miles of approaches, $177,000 a mile.

## ILLINOIS CENTRAL SHOP KINKS.

The Illinois Central is making all the metallic valve and piston rod packing for the system at its Burnside (Chicago) shops by means of the molding device illustrated herewith. The method which it superseded—that of heavy single-ring tong molds, each needing a man to handle—required five men, including the trimmer, and they were unable to keep up with the demand. A quicker and easier method was needed and the device here shown was worked out. It is simply an extension of the tong mold principle, in which the parts are large enough to mold the several rings of a full set of packing at one time.

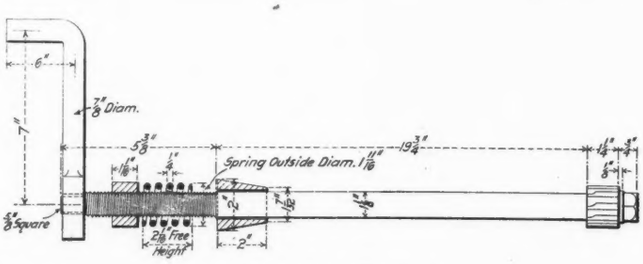
The device stands on the floor close to the end of a bench, to which the lever for closing and opening the device is secured. The dies are affixed to the stationary part, and when the plate on the movable part is brought against the die, the device is ready for pouring. There is a gate or inlet in the top edge of the die plate for each ring, and a connecting channel between gates for a uniting bar.

As the die gets very hot, an air pipe is provided for cooling it. This pipe runs along the top of the plate on the movable part, as indicated, and has perforations on the side toward the die. A spring-closed valve in the air-supply pipe under the end of the bench is opposite the end of the short lever to which the connecting rod is attached, and is opened automatically by the same when the device is opened after a cast, delivering jets of air against the heated die plate.

The gates are sawed from the rings on a band saw and the rough spot thus left on the ring smoothed off on a trimmer like a disk milling cutter, 12 in. in diameter, except that the cutting edges are not tempered and may therefore be sharpened with a file. This trimmer is mounted on a small lathe. Two men easily produce all of the packing for 1,400 locomotives now, one casting and the other trimming. Both Jerome and United States packing are made, there being dies for the valve and piston rod packing of each. A coal furnace, with natural draft, is used for heating the metal, as oil makes the metal too hot, often burning it if not carefully watched.

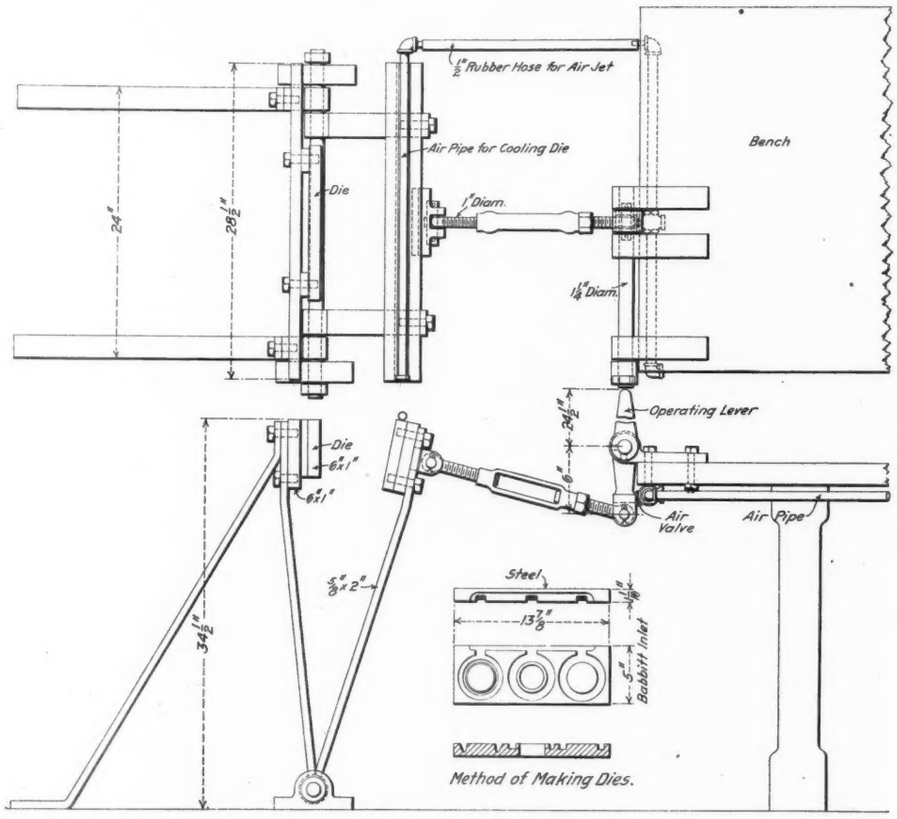
This same device is also used for making the corner sections in the molding surrounding the letter panels on the locomotive cabs. These are in quadrant form, of course, and the under side is hollowed out to save metal. They are made a dozen at a time, with the screw holes cast in, so that they are ready for application as soon as the gate connection is dressed off. Another useful product of this device is lead fillers for axle centers. Instead of the usual method of hammering a piece of lead into these conical openings, one of the little cones cast for the purpose is driven in by one or two blows of a hammer. They are made in large quantities, in two sizes, from scrap babbitt. If too large for the opening, the end is cut off quickly with a chisel.

A quick and simple method of repairing the worn ends of locomotive brakebeams is in use in the blacksmith shop. Formerly, when the end was upset to get enough metal on the worn shoulder and a sleeve then welded on the brake head spindle and worked down under the hammer, two hours were




Bell Yoke Reamer.

required for a beam. Now the beam end is brought to a welding heat, a strip of iron of the proper dimensions, also at a welding heat, is laid over the worn or grooved parts, and the whole put in a die under the steam hammer and welded up. The whole job is done in about 15 minutes. New beam ends are also formed in such a die, there being a breaking down and a finishing die in the same block, and the operation performed with one heat. In the finishing die, the bottom section is deepr than the upper to avoid lifting the piece out when the top part is withdrawn.




Metallic Packing Molding Machine.

For reaming out the crank-shaft holes in locomotive bell yokes without removing them from the boiler, the device shown herewith is used. The shank is 1⅛ in. in diameter and 27⅛ in. long, with a shell reamer on one end, and threaded 4⅜ in. inside the crank at the other. The sliding

cone fits into the hole opposite to the one being reamed, and is held to place by the spring and nut through which the threaded part of the shank travels as the reamer is drawn through the hole. The device must be reversed, of course, to ream the other hole.

All of the bolt holes in eccentrics and straps are drilled from jigs, instead of laying out with sheet metal templets or with dividers from the print, saving much time. For case hardening small pieces that are wanted in a hurry a pot of cyanide of potassium is kept red hot. The piece is dipped in for a few minutes—the time depending on the depth of hardening desired, of course—and then quenched, only five or ten minutes being required. This is only for emergency use.

## A SIMPLE EQUATED TONNAGE COMPUTER.

J. M. Daly, Car Accountant of the Illinois Central, has been at work for two or three years on a device for registering automatically the number of cars in a freight train and their equated tonnage. The latter is figured on a predetermined basis, designed to equalize the drawbar pull for all trains, so that they can make uniform speed over their divisions. Mr. Daly's first device, which he described in a paper before the New York Railroad Club in October, 1905, looked somewhat like a cash register, and was mechanically unsatisfactory. He worked out a second device, based on different principles,


Daly's Equated Tonnage Computer.

and this, by experiment and use, has been perfected in the present form, which is illustrated herewith.

The object is to make it possible to load locomotives uniformly, regardless of the number and varying weights of the cars in the trains. The method of adjusting the tonnage and getting the locomotive ratings under this plan is given by the inventor as follows:

Decide on what reduction, if any, will be made from the maximum tractive power of the locomotive to allow for weather and rail conditions, defects in power, making up time, etc. If an engine has a maximum tractive power of 40,000 lbs., and the desired reduction is 10 per cent., the rating of the engine will be 36,000 lbs. Next, there must be a basing or rating unit for the cars. As the average gross weight of cars is about 40 tons, this has been taken as the basing unit.

To determine the tonnage rating of the locomotive, it is given a train of as many cars weighing, loaded, 40 tons, as will cause it to exert 36,000 lbs. tractive power on the ruling grade at the required speed. If, for example, it can haul 50 of these cars, its rating will be 2,000 tons of such unit. But because of the less resistance, it can haul more than 2,000 tons of loaded cars weighing 50, 60 or 70 tons, and conversely, it cannot haul so great a tonnage of cars weighing 30, 20 or 15 tons.

If the locomotive is given a train of all cars weighing 50 tons gross, it will be found that it can haul, say, 42 cars—2,100 tons—at its maximum rating. Therefore, to find what the equivalent engine loading of the heavier car would be on the 40-ton basis, divide 2,000 tons by 42, which gives, approximately, 48 tons. Carrying out this same determination for other weights, it will be found that

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| A 60-ton | gross | weight | car | has | a | loading | equivalent | of | 55 tons. |
| A 70-ton | " | " | " | " | " | " | " | " | 62 " |
| A 30-ton | " | " | " | " | " | " | " | " | 32 " |
| A 20-ton | " | " | " | " | " | " | " | " | 25 " |
| A 15-ton | " | " | " | " | " | " | " | " | 22 " |

The computing device is designed to add together the equivalent instead of the actual gross tonnages of the cars.

The machine is 14 in. x 14 in. and weighs 28 lbs. It has a circular face plate marked with tons and fractions of tons. Within, and concentric with this plate, is a narrow, perforated ring, the perforations coming opposite the divisions on the plate. At the center are two registers, one showing the number of cars and the other the adjusted tonnage. To work the machine, the point of the stylus, seen lying below the machine, is inserted in a hole in the movable ring opposite a figure, and the ring rotated to the right until the stylus strikes a stop under the plate. The stylus is withdrawn and the operation repeated as many times as there are cars to add, the machine adding the equivalent tonnage each time and showing, on the registers in the center, the total equivalent tonnage and also the number of cars that have been added. For example, if the way bill calls for a 60-ton, gross weight, car, the stylus is put in the hole opposite this number and the ring rotated to the stop. The register adds only 55 tons, instead of 60 tons; for a car weighing 30 tons it adds 32 tons. When the register shows 2,000 tons—if that be the locomotive rating—the train is complete, whether its actual tonnage be 2,300 tons or 1,900 tons. The drawbar pull in either case will be the same. As this work can be done by a yard clerk in a very few minutes, the saving in time in despatching a train is obvious—as much as an hour, it is claimed.

The device is now in experimental use on two large roads, and it is said that results for the first month showed a net saving of from 4 to 7 per cent. in train service as compared with the old method of rating engines on the actual tonnage basis. Mr. Daly summarizes the advantages and savings claimed for the device as follows:

Equalized resistance to all trains.

Accurate computation of train-tonnage.

More accurate handling of waybills.

Saving of one hour per train in departure from terminals.

More room for incoming trains at terminals.

Saving of fuel on engines held waiting for conductors to get the waybills and the tonnage, and to foot it up; and then to either set out or pick up cars to balance the rating.

Saving of fuel on engines held out of yard waiting to get in on track occupied by train ready to leave; also, overtime to crews.

The daily reports of individual train tonnage (made in carbon) for the superintendent, the master mechanic and the superintendent of transportation, are on their respective desks the next morning, and help them to keep up with the business, to fill out trains better, and to keep better informed as to the condition of the motive power.

Weekly and monthly reports are compiled from the totals of the daily reports with very little expense; three hours' work each month will suffice.

The device does away with mental calculation, thus eliminating many chances for error; it relieves the conductor of annoying work, giving him more time to look after the physical handling of his train.

It will increase the average miles per day of both engines and cars.

By checking waybills and computing the tonnage in advance of train movement, missing waybills can be located, and "hold cars" can be located and switched out of the train make-up, thereby avoiding delay to road crews after reporting.

## COMPENSATED LOCOMOTIVES.*

BY HERBERT T. WALKER.

II.

We now come to the most important and interesting side-lever locomotive ever built, which is illustrated in Figs. 2 and 3. It was designed and patented by Thomas Russell Crampton, and built by E. B. Wilson & Co., of the Railway Foundry, Leeds, England, in the year 1847. It was completed and put in service early in the following year. The principal dimensions were: Driving wheels, 72 in. diameter (some authorities give the diameter as 78 in.), cylinders, 16 in. diameter by 20 in. stroke. All of the wheels were drivers and the wheel base was 16 ft. long. This engine weighed 32 long tons, which gave 8 tons to a wheel—an excessive weight at that time, when a 25-ton engine was regarded as heavy. The horizontal diameter of the boiler was 3 ft. 9 in., and the vertical diameter 4 ft. 1 in., concaved to clear the leading axle. Heating surface of firebox, 96.6 sq. ft.; of tubes, 1,175 sq. ft.; total heating surface, 1,271.6 sq. ft.; grate area, 14 sq. ft. The drawing shows the name plate blank, but the engine was named "Lablache," after a noted operatic singer of the day.

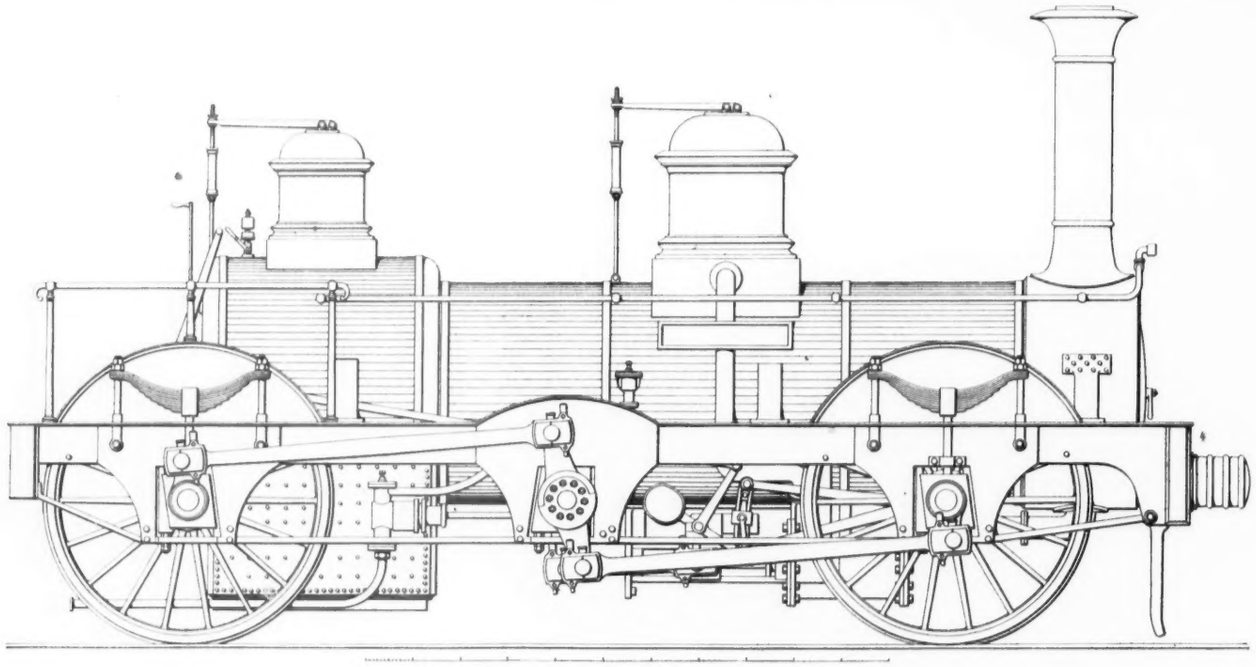


Fig. 2—Crampton's Side Lever Engine "Lablache," 1848.

It will be observed that the engine had a symmetrical appearance. It had double frames, but the driving wheel boxes worked in the outside frames only. The heavy side levers, or vibrating beams, were bolted to sleeves which rocked in journal boxes fastened to both inside and outside frames, and each sleeve also vibrated on a fixed shaft which formed a stout cross brace for all four frames. On the inner ends of the sleeves were forged pendulous arms, which, by means of short connecting rods received motion from the pistons, as can be seen by the drawing. This brought the cylinders very low down, and they were bolted to supplemental inside frames which depended partly for their support on the boiler—a piece of construction which appears weak when compared with the remarkably substantial mounting of the side levers.

Looking at this locomotive from the equilibration standpoint, we note some good features, chief among them being the vibrating side levers journaled near the center of gravity of the engine, and coupled to the cranks in such a way that when the front driving wheel crank was, for example, on the back center, the rear crank was on the front center, and thus the momenta of all these oppositely moving parts were balanced. The balancing was not, however, perfect, since it left the reciprocating masses directly connected to the pistons unprovided for, but the disturbing effects of cross-head vertical thrust was eliminated, since the stresses set up by the angularity (very slight in this engine) of the inside connecting rods were wholly sustained by the rigid frame connecting the cylinders with the side lever bearings. This is one advantage of the intermediate driving shaft locomotive, for in the

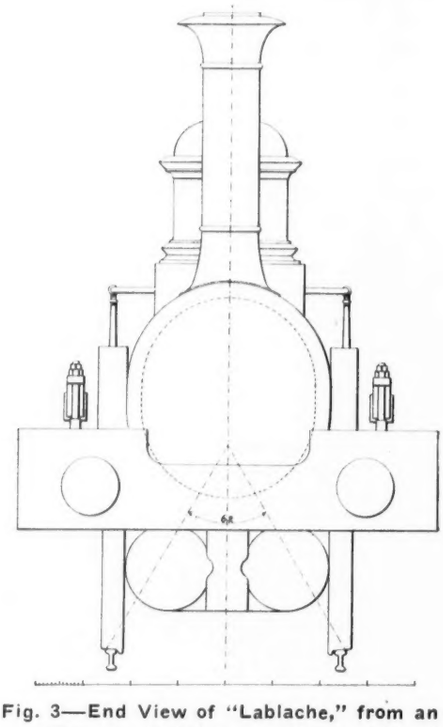


Fig. 3—End View of "Lablache," from an Original Tracing, Dated Leeds, March 11th, 1848.

ordinary engine the effects of cross-head vertical thrust arises from the fact that the wheels and axle boxes are rigidly supported by the rails, but the cylinders and cross-heads are carried by a frame yieldingly supported by springs, and moving vertically within the pedestal clearance. As regards vertical thrusts on the outside of the engine under notice, it will be seen that with the cranks in the position shown the angles of the two connecting rods exerted opposing stresses on the side lever, the bottom rod upward and the top rod downward, which would appear to contribute to steady running.

The late David Joy, inventor of the radial valve gear bearing his name, had much to do with the "Lablache," for he was draughtsman at the Railway Foundry, Leeds, at the period under notice. Joy's diaries were published in the *Railway Magazine* (London) beginning in the issue for May, 1908, and he therein states that the engine was in perfect balance, for a half-size model was made and set up on trestles, loose, in the drawing office. When the model was turned round as fast as possible, the balance was not disturbed. But the design was mechanically incorrect, for as the two cranks could not reach their dead centers at the same time, a certain amount of "spring" had to be given to the side lever to prevent the wheels skidding. The difficulty was overcome by making the side lever in two parts and bolting them together at the center, as shown in the drawing, so that the two ends had a slight independent movement. The blast pipe had a solid plug variable exhaust. As the vertical diameter of the boiler was greater than the horizontal diameter, the flat sides were strengthened by a number of cross braces which cut out several rows of flues. Nevertheless, the heating surface was liberal for the period at which the engine was built.

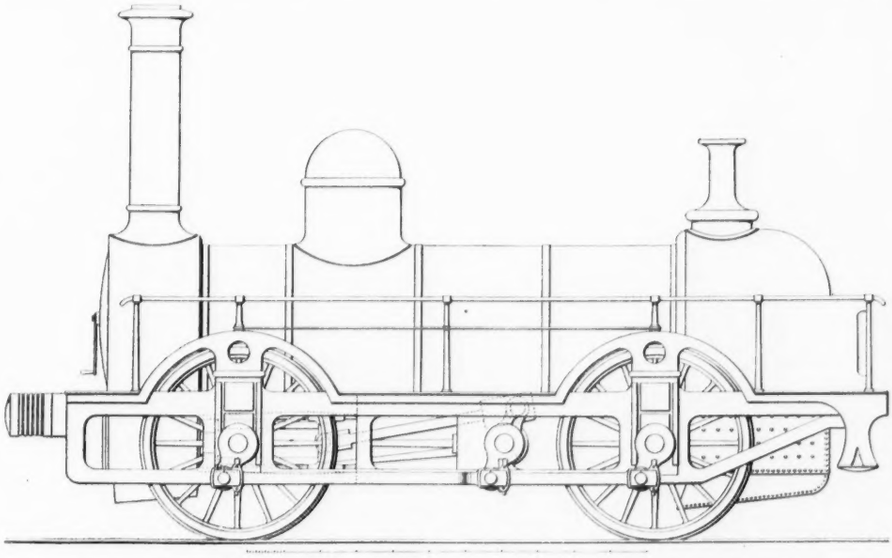


Fig. 4—Tayleur and Co.'s Intermediate Crank Shaft Engine. Shrewsbury and Chester Railway. 1848.

The "Lablache" was a fast engine, for during official tests it attained speeds up to within a fraction of 79 miles an hous "with a light train." It is unfortunate that in nearly all the performance records of these old high-speed engines the weight of the train is omitted, which heavily discounts their scientific value and hinders a comparison being made with modern practice. There is, however, a note in Sekon's "Evolution of the Steam Locomotive" which states that the "Lablache" hauled a freight train of 430 long tons at an average speed of 30 miles an hour, which was no mean performance. The engine was tried on the Midland and other railways, and appears to have worked satisfactorily, but no railroad company would purchase it on account of its great weight. It was not long in service, for the firebox was weak or faulty in construction and came very near exploding in April, 1848, the top rows of stays being all pulled over the heads, and the firebox practically destroyed. This noteworthy engine thus came to an untimely end. It was subsequently dismantled, made into a common four-coupled engine and sold to a railway contractor.

Crampton was a prolific designer of locomotives and protected them by some half-dozen patents extending over the period from 1842 to 1849. He seems to have been a man of means, for he built some locomotives that were not for any particular railroad, but were run experimentally on more than one line. As we have seen in the "Lablache," he gave some attention to counterbalancing, but save in the case where he balanced the reciprocating parts by extra wheel weights, as previously recorded, he subsequently sought to create stability by a long rigid wheel base with driving wheels behind the firebox, his engine "Liverpool" being the culmination of this idea; but his theories were not generally shared by other engineers.

No original drawings of the "Lablache" can now be obtained except an original tracing (dated Leeds, March 11, 1848), showing the front end view of the engine. This tracing is in the writer's possession and is doubtless correct, as it was made at about the time the engine was completed. Taking this front view (Fig. 3) in conjunction with Crampton's patent specification lithographs, a fairly correct side elevation has been constructed and reproduced in Fig. 2. It may be noted that Crampton applied for a British patent by filing a provisional specification on June 19, 1847, the final specification and drawings being filed on December 18 of the same year. But as the engine was completed early in 1848, it must have been commenced about the time Crampton filed his provisional specification—for in those days it occupied several months to build a locomotive. At any rate, we may safely assume that the working drawings were prepared before the inventor filed his final specification and drawings, and the patent drawings were thus probably made from the working drawings.

At first thought it may appear strange that the original drawings of some of the most peculiar and interesting locomotives ever built should have disappeared, but their designers, who were, generally, men not connected with railroads, had, as a rule, to build these engines at their own charges. Then, having built them it was a matter of difficulty to induce conservative railway directors to allow any "experimental locomotives" to be tried on their tracks—not even on a siding. In order to protect themselves and secure a possible return for the heavy outlay involved (a serious matter to a man of ordinary means) the designers of these engines patented their inventions. But this only added to their financial straits, for the iniquitous old British patent law allowed patents for similar inventions over and over again, giving inventors only a semblance of protection, inasmuch as patents were granted without examination as to novelty, and the only way to establish the validity of a patent was by litigation. So that after paying enormous fees and stamp duties the unfortunate inventor would perchance either have to commence a still more expensive lawsuit to defend his rights against some unscrupulous copyist, or, likely as not, he

would become involved in an action brought against him by a prior inventor onto whose grounds he had unwittingly trespassed. In short, patents were always expensive and never satisfactory to the inventor, and we can readily understand how the patentees of locomotives were, after the trouble and expense of building their engines and getting them tried, put to the final profound disappointment of their rejection by the railroad company, the reason of their failure being not always an inherent defect in the design but rather poor construction, bad workmanship, or careless handling, causing a breakdown which was seized on by the railroad mechanical superintendent as a reason for condemning the whole design, and the poor inventor was, in the majority of cases, finally compelled to sell his engine for scrap metal.

We can thus easily imagine our inventor becoming discouraged and destroying his working drawings, leaving nothing for the future historian but the records of the patent office, which, if they may appear lame and unsatisfactory to the reader, they at least furnish a precise date and a more or less exact description which no writer can afford to overlook, for, to quote the words of the immortal Colburn, "the patent records form the most indisputable points of reference, and in many cases they anticipate the improvements attributed by tradition to those who were, perhaps, all the better engineers for not having been patentees."

About nine months after Crampton lodged his 1847 specification, William Beckett Johnson, of Liverpool, applied for a patent on a locomotve very similar to the "Lablache." Johnson proposed to employ side levers merely for the purpose of coupling the driving wheels, and the connecting rods were to actuate the driving cranks direct instead of by arms on the side lever sleeves as in Crampton's engine. An outline of Johnson's engine is given in diagram C (Fig. 1), which is a copy of the lithograph accompanying his specification No. 12,083 of 1848. In designing this engine the inventor aimed at a low center of gravity with large driving wheels, attaining this end by passing the leading axle through the smokebox, the trailing axle being partly behind and partly above the firebox, which was of peculiar shape. The advantages of the design are not apparent to modern eyes, and the whole arrangement was inferior to the "Lablache" and even earlier side-lever engines, for, as the piston rods were connected to the driving cranks the balancing was very imperfect, and vertical thrust was the same as in common locomotives. It is doubtful if any engine was built on this principle. One serious objection would be the long rigid wheel base (about 18 ft.), although this might have been shortened in practice. It is interesting to find that Johnson describes and shows in this same specification a design for a friction geared locomotive almost exactly like the "Fontaine" engines which were built at the Grant Locomotive Works a few years ago.

The next engine included in the division now under consideration had the intermediate driving shaft, but, unlike the locomotives hitherto described, this shaft revolved, and had regular cranks instead of vibrating arms. Fig. 4 shows this engine. It was designed by Charles Tayleur & Co., and built at their Vulcan Foundry in the year 1848. This historical firm, of which George Stephenson was an original partner, was founded in 1832 and is still doing a prosperous business at Newton-le-Willows, Lancashire. By the courtesy

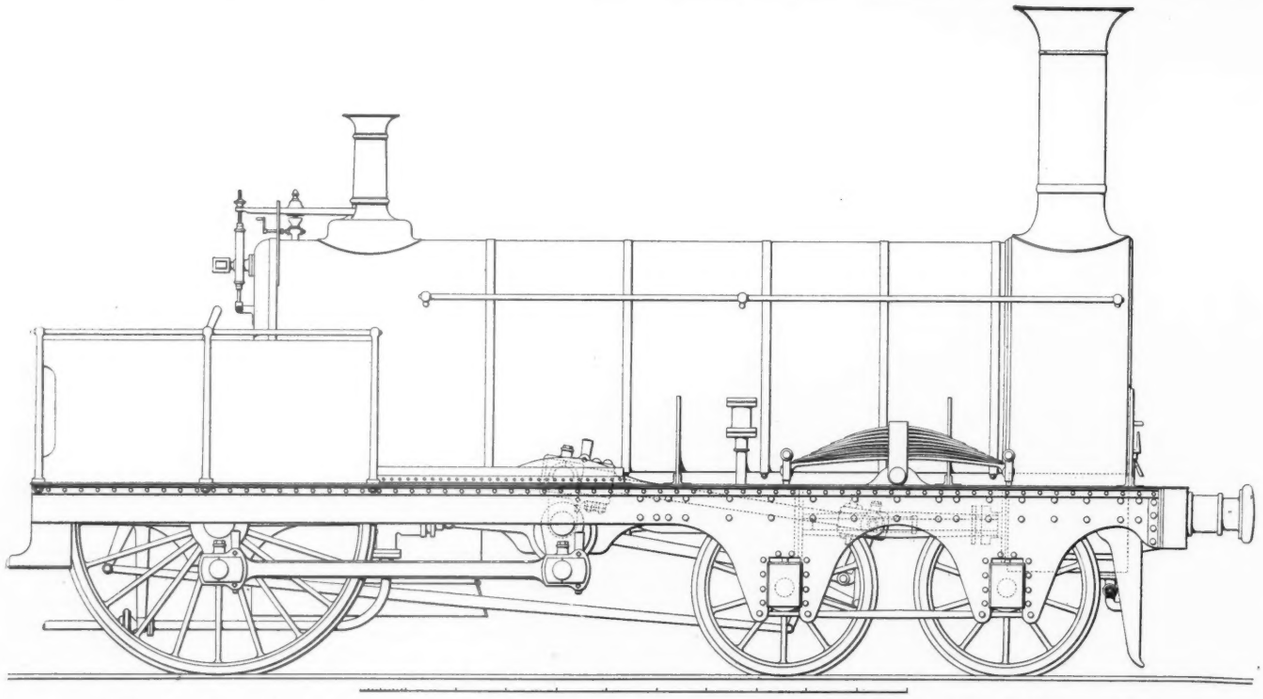


Fig. 5—Crampton's Intermediate Crank Shaft Engine, "Folkestone," South Eastern Railway, 1851.

of the Vulcan Foundry Co. the drawing shown in Fig. 4 is here presented. This engine worked on the Shrewsbury & Chester Railway, now a part of the London & North-Western system. The cylinders were 16 in. diam. by 24 in. stroke; driving wheels, 63 in. diam.; total heating surface, 1,293 sq. ft.

The intermediate revolving crank shaft was journaled rigidly in the frame, and its advocates claimed that this shaft, running in fixed bearings near the center of gravity of the engine and free from rail shocks, was not liable to breakage. If it did break, no serious effects would result, because the driving axles and wheels would remain intact. Moreover, cross-head thrust, or at least its action on the engine as a carriage, was eliminated, as the cylinders and intermediate shaft were bolted rigidly to the same frame, as in the "Lablache." Coming to the outside of the engine, we find that the driving shaft cranks were virtually revolving cross-heads, having the same movement as the driving-wheel cranks, and therefore the stresses on their always horizontal connecting rods were direct instead of angular, as is the case of a reciprocating cross-head. It would thus appear that, theoretically at least, this engine would run without rolling motion. Again, the reciprocating parts were well balanced,

because the inside and outside cranks were 180 deg. apart, and we may thus accept the common reports of these engines that they ran with remarkable steadiness. It must be noted that each piston had double rods which straddled the leading axle, and that the front coupling rod was forked, with double brasses at the power shaft crank pin, permitting the rear connecting rod to work between them. The wheel axles had double journal boxes.

Locomotives of this class have always been described as Crampton's engines, but the plan appears to have been originated by William Bridges Adams, an engineer of considerable note, who was an early advocate of a combined locomotive and car for short rural lines. As far back as 1848 Adams built a steam motor passenger car named "Fairfield" for local traffic on the Bristol & Exeter Railway. The entire structure weighed 12½ tons and carried 48 passengers. The engine had the intermediate driving shaft similar to that shown in Fig. 4, and worked very well. Adams patented this device in 1846, but it reappeared in Crampton's patent of 1849, and has since been erroneously ascribed to him.

In 1849 Crampton designed an intermediate crank shaft locomotive with one pair of driving wheels, and ten engines of this pattern were built by Robert Stephenson & Co. for the South Eastern Railway. One of them, the "Folkestone," was exhibited at the London Exhibition of 1851. Fig. 5 illustrates this engine, and the drawing was prepared from a blue print kindly furnished by the builders of the engine, whose works have lately been removed to Darlington. The principal dimensions were: Cylinders, 15 in. diam. by 22 in. stroke; driving wheels, 72 in. diam.; wheel base, 16 ft.; weight in working order, 26¼ long tons. During a trial trip the "Folkestone" hauled nine coaches up the New Cross grade of 1 in 100 at 45 miles an hour, doing the 25 miles to Reigate in 25 minutes; started from Reigate and stopped at Tonbridge, 20 miles in 19½ minutes, attaining a maximum speed of 75 miles an hour; 1¼ miles were run in 1 minute; two miles in 1 minute, 44 seconds, and three miles in 2 minutes, 45 seconds. This was a creditable performance and the record will be found in Bennett's "Historic Locomotives" (London, 1906). As in the previous example (Fig. 4) the engine ran with remarkable steadiness. These engines did the "Boat Express" and main line work on the South Eastern Railway until about the year 1864.

Engineers in the United States do not appear to have given much attention to the improvement of the stability of the locomotive. For the refinements of locomotive design in the early days we must look to the land of the cradle of the steam engine. Of course, there were the well-known "mud diggers," "crabs" and "grasshoppers," all having intermediate gearing between the cylinders and driving wheels, as indeed some of the earliest British engines had similar arrangements, but they were not designed with special reference to the subject under review, and they need not delay us here.

The writer has succeeded in obtaining details of but one example of an American locomotive of the side lever design, and it is therefore of interest, especially as it is the only engine of its class which appears to have done long service. This engine was named "Utility," and is illustrated in Fig. 6. It was built in 1852 by Seth Wilmarth, of Boston, to the designs of Alba F. Smith, then Superintendent of the Cumberland Valley Railroad. Its principal dimensions were: Cylinders, 12½ in. diam. by 16 in. stroke. The driving wheels were of cast iron with chilled rims, and were 42 in. diam.; wheel base, 16 ft. 6 in. long. The valve motion was of the drop D hook pattern. It will be noticed that the engine was built on the same principle as the "Lablache" (Fig. 2), but was wanting in the symmetrical appearance of Crampton's locomotive. As the center of the vibrating beam was much above the centers of the driving wheels, the rear driving boxes worked in oblique pedestal jaws. This engine had India rubber springs.

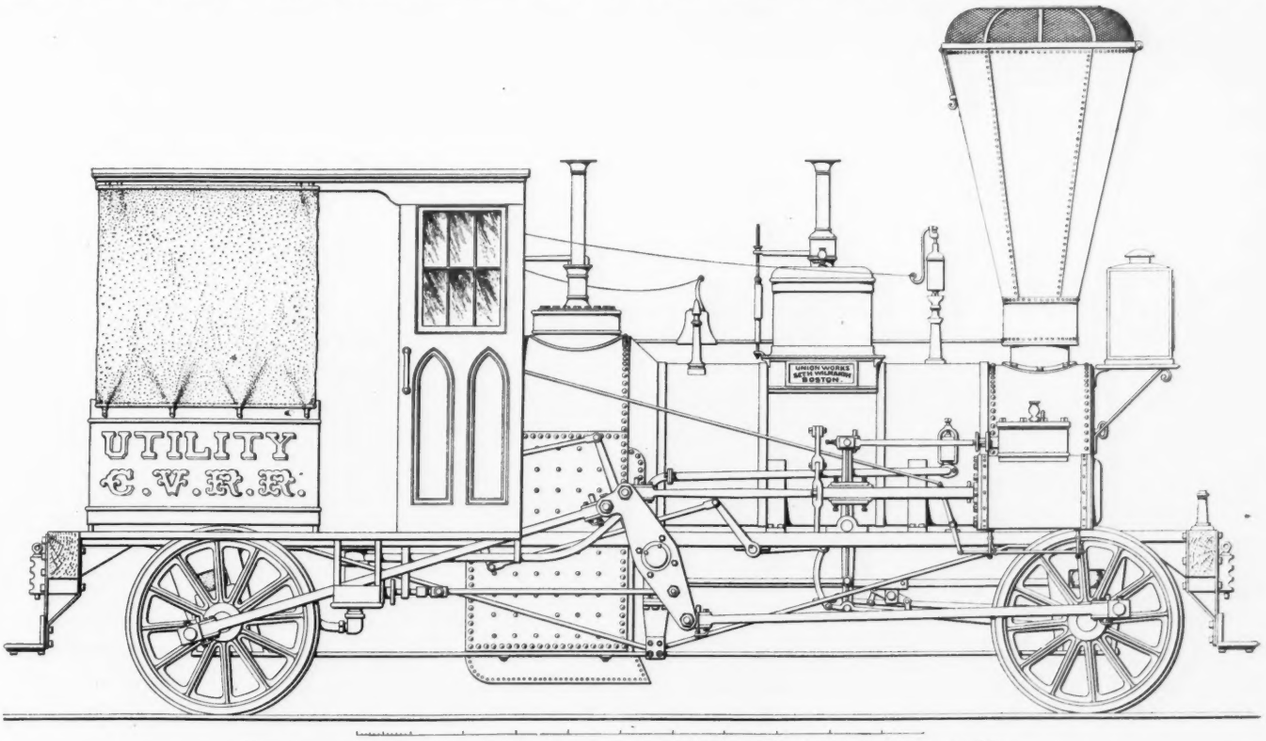



**Fig. 6—Smith's Side Lever Engine. Cumberland Valley Railroad, 1852.**

In 1862, during the Civil War, the "Utility" was involved in a wreck near Harrisburg while hauling soldiers, a number of whom were killed. The engine was then taken to the Chambersburg shops for repairs, and in the interval, it was burned, along with several cars, by Confederate troops. In 1863 it was rebuilt with the same wheels placed front and back of the firebox and the cylinders brought in line. In this condition it was used as a switching engine in the Chambersburg yards until 1882, when it was sold to the Carlisle Manufacturing Company and used by them until it was scrapped in 1896.

The above particulars have been kindly furnished by C. H.

Caruthers, of Yeadon, Pa., and Col. J. L. Lawrence, Assistant Master Mechanic of the Cumberland Valley Railroad Company, who also placed a photograph of the "Utility" at the writer's disposal. As the photograph was old and dim, a satisfactory half-tone engraving could not be made, and therefore, with the valuable co-operation of Mr. Caruthers, a fairly correct line drawing has been prepared, which is reproduced herewith.

No subsequent records of side lever locomotives can be found until 1873, when an engine of this class was exhibited at the Vienna Exposition of that year. It was designed for heavy passenger service by Mr. Ch. L. Carel from a suggestion of Mr. Belpaire, Inspector General of the Belgian State Railroads. An outline of this locomotive is shown in diagram *D* of Fig. 1, from an engraving originally published in *Engineering* (London). It was described as one of the most remarkable engines in the exhibit, and the advantages claimed were that "as the pistons and their immediate connections move in opposite directions to the coupling rods, the reciprocating parts are balanced." Another point urged in favor of this engine was that the cylinders and working parts were in the immediate view of the engine-driver and fireman, but this doubtful advantage was overbalanced by the weak and poorly designed frame for supporting the cylinders, which was not unlike that shown in diagram *A* (Fig. 1). This alone would have condemned the engine in the eyes of any American or British engineer. The principal dimensions of Carel's engine were: Cylinders, 17¾ in. diam. by 23⅝ in. stroke; wheels, 67 in. diam.; total heating surface, 1,309 sq. ft. The engine had the Belpaire firebox and the valve motion was a kind of Walschaerts gear; each link, however, instead of being driven by an eccentric derived its motion from the vibrating beam on the opposite side of the engine.

Aside from a few tramway locomotives built for foreign roads no attempt appears to have been made of late years to revive the side-lever principle for locomotives, but suggestions have been published from time to time, and some recent patents have been taken out which cover vibrating beams in connection with double cylinders—either simple or compound. These designs have merit, for the reason that as each end of the beam is connected to a piston rod the balancing is more perfect than it is where one end of the beam is coupled to the piston rod and the other end to the driving crank.

In 1888 Samuel F. Prince, Jr., commenced to study the problem of locomotive counterbalancing, and he subsequently obtained several patents for his inventions. A prominent feature of Mr. Prince's design is the employment of four cylinders in conjunction with vibrating beams, all the working parts being secured to the engine frame. This gives a balanced locomotive without a cranked axle, the reciprocating parts being balanced in a vertical plane, and the strains induced in these parts are entirely self contained. This design is certainly worthy of attention, but as a fully illustrated description of Mr. Prince's proposed engine will be found in the *Railroad Gazette*, June 9 and 16, 1905, pages 637 and 665, it is unnecessary to enter into details here.

In 1893 Ransom C. Wright obtained a United States patent for a side-lever locomotive with four cylinders, and at the writer's request he has forwarded a blue-print from a working drawing from which the outline shown at *E*, Fig. 1, has been prepared. The diagram is so clear that it needs little explanation, but it may be noted that Mr. Wright proposes to have separate slide valves for each cylinder, the valve stems being connected to either end of a small vibrating beam actuated by an ordinary rocker arm. But this arrangement is not essential, as the cylinders could be served by one slide valve, as in Mr. Prince's design previously noticed. The late Mr. M. N. Forney also gave the matter of counterbalancing much attention, and in 1893 and subsequent years he patented several systems to enable the momentum of reciprocating parts to be counterbalanced without inducing a disturbing action at right angles to the movement of such parts. Mr. Forney's design included vibrating beams in connection with four cylinders, and he proposed to dispense with cross-heads and guide bars by substituting parallel motion, as will be understood by a glance at diagram *F* of Fig. 1, which is copied from one of Mr. Forney's patent drawings. It will be observed that this system permits a close position of the two cylinders. There should be no objection to parallel motion on a locomotive, providing the parts are well designed.

In the course of a recent correspondence with the gentlemen just named, it was curious to note the similarity of their experience in connection with the apparent impossibility of getting railroad companies or engine builders interested in their designs. In this regard, their experience is identical with that of other inventors, many of whom have had the satisfaction of seeing their inventions come into use after the expiration of their patents.

When we come to early engines included under the second classification, namely, locomotives with a plurality of cylinders and cranks, the information is meagre and but few seem to have been built. Four-cylinder locomotives are of some antiquity, inasmuch as they date so far back as 1826, but in that year they were simply built to obviate the use of coupling rods by employing one cylinder for each driving wheel.

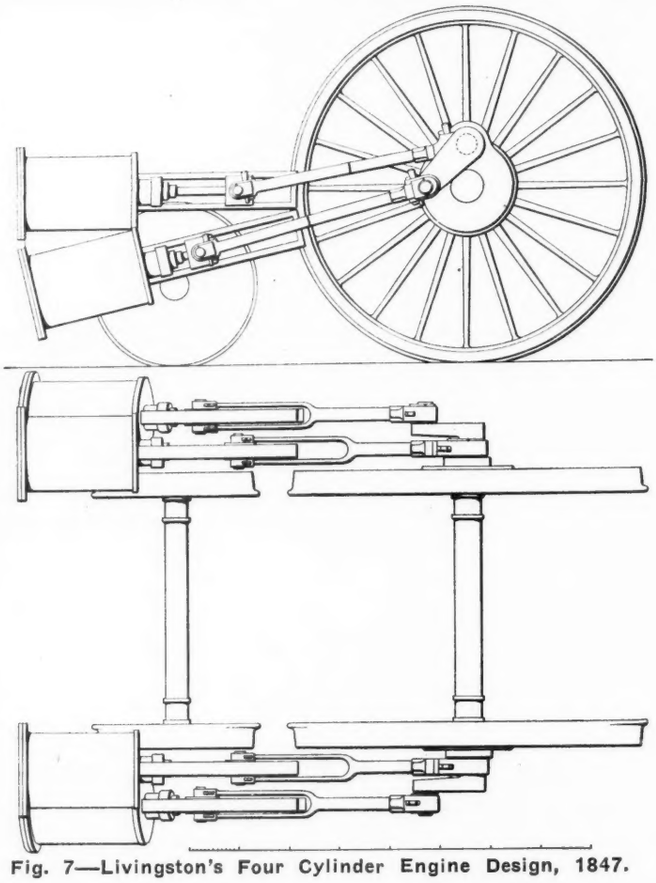


Fig. 7—Livingston's Four Cylinder Engine Design, 1847.

In 1839 a British patent was granted to Dodds & Owen for a three-cylinder locomotive, the leading axle being cranked and worked by a single inside cylinder, and the trailing wheels were worked by a pair of outside cylinders, no coupling rods being used. This engine was never built, but it appears to have been the forerunner of the Webb three-cylinder compound engine of recent years.

A three-cylinder design was patented by Stephenson & Howe in 1846 (British patent No. 11,086), and one or two were subsequently made for the York, Newcastle & Berwick Railway, now a part of the North Eastern system. The two outside cylinders were 10½ in. diam. by 22 in. stroke, and the inside

cylinder (in the center line of the engine) was 16⅜ in. diam. by 18 in. stroke, all connected to one axle, which had a pair of driving wheels 80 in. diameter. The two outside crank pins were placed next the same side of the axle, so that they were both at the half forward or backward stroke at the same time, the effect being that cross-head thrust and momentum of reciprocating parts took place simultaneously on both sides of the engine, and the tendency to sinuous action was removed. The only disturbance was the fore and aft stresses set up by the synchronously moving reciprocating parts actuated by the outside pistons. The disturbing effects of the masses impelled by the inside piston, the crank for which was at right angles to the two outside cranks, had no appreciable effect since it was in the center line of the engine. Although these engines were reported to have run without nosing or rocking, and without balance weights in the wheels, the plan was not perpetuated, but Norris adopted it for two or three engines made for the Philadelphia & Wilmington Railroad. Messrs. Robert Stephenson & Co. have searched their records for drawings of the Stephenson & Howe engines, but none can be found. Illustrations of one of the engines were published in Clark's well-known "Railway Machinery."

In 1847, A. S. Livingstone obtained a British patent for a four-cylinder locomotive design, in which he proposed to eliminate cross-head thrust by a peculiar disposition of the cranks, as will be understod by reference to Fig. 7, showing a side view and plan of the working parts, copied from the patent drawings. Livingstone extended the idea embodied in the Stephenson & Howe engine by employing an additional cylinder, but placing them all on the outside. An examination of the drawing will show that the inner pair of pistons actuated crank pins on the driving wheels, and the outer pair were connected to return cranks. The inner and outer cranks on the same side of the engine were at right angles to each other, and both pairs of cranks were identically arranged on each side of the engine, giving simultaneous horizontal stresses and cross-head thrusts on both sides of the frame. The description of Livingstone's design may be continued by quoting his specification, as follows: "By this arrangement and application of four steam cylinders to one locomotive, one on each side always acting in the same direction or simultaneously, the oscillating or irregular motion to which all engines are subjected may be obviated. By these arrangements I am enabled to dispense with the cranked axle of the locomotive engine, and apply an equal amount of force to the driving wheels on each side of the engine at one and the same time, and not alternately as is the case with engines at present in general use." As far as known, no engine was ever built on this plan.

In the United States, G. A. Nichols, mechanical superintendent of the Reading Railroad, designed and patented in 1848 the employment of two or more pairs of cylinders in the same engine, and in 1854 John Cochrane exhibited a model of a four-cylinder engine at the fair of the Maryland Mechanical Institute, but the French engineers were the first to reduce the idea to modern practice, for in 1863 a number of four-cylinder engines were built to the designs of M. Petiet, engineer-in-chief of the Northern Railway of France. These engines were successful, but as they were designed to reduce the number of coupling rods without regard to the matter of counterbalancing, they are not pertinent to our subject.

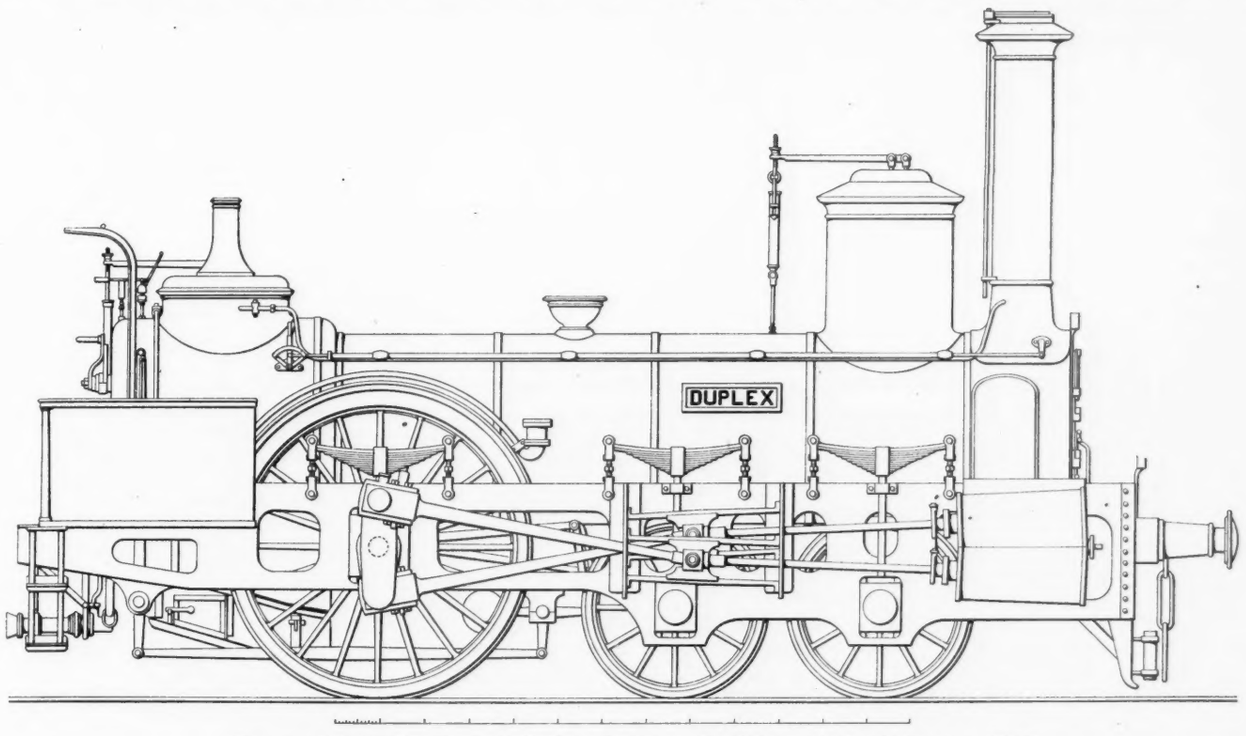



Fig. 8—Haswell's Four Cylinder Engine. Austrian State Railways, 1861.

The most important multiple cylinder locomotive of by-gone days was John Haswell's four-cylinder balanced engine "Duplex," designed in 1861 and built for the Austrian State Railways. It was shown at the London Exhibition of the following year and attracted much attention. Fig. 8 shows this engine. The illustration was prepared from a plate published in *The Artizan* (London) of 1862, and is so complete as to need little explanation. The cylinders were 10⅞ in. diam. by 24⅞ in. stroke, and actuated double outside cranks. The driving wheels were 81 in. diameter, and the wheel base was 11 ft. 6 in. long. Grate area, 15 sq. ft.; heating surface of firebox, 84 sq ft.; of tubes, 1,260 sq. ft.; total heating surface, 1,344 sq. ft. One slide valve served each pair of cylinders, the steam ports being crossed. Weight of engine in working order 31 long tons. As in the case of previous engines, it was asserted that this locomotive ran with absolute steadiness at all speeds, but the vertical thrust of two cross heads on each side alternately must have caused some rocking motion, but it was probably slight owing to the fact that the stresses were

exerted near the center of gravity of the engine. It is also evident that the reciprocating parts were not in absolute balance, since the center lines of the two cylinders formed angles with the horizontal center line of the crank shaft, and thus the cranks did not reach their dead centers simultaneously, but, as Mr. King pointed out in his article published in the *Railroad Gazette*, Dec. 8, 1905, "by reason of the trimmed cylinders converging to drive on the same center there was a difference in the moments of maximum tangential force of 6 deg. on the same side of the engine, or of 12 deg. for the aggregate on both sides of the engine," thus giving the engine a superior torque, and altogether the "Duplex" was a noteworthy locomotive reflecting great credit on the designer, who, by the way, was a Glasgow engineer.

If the reader wishes to trace the history of the four-cylinder balanced locomotive down to recent times, he may refer to Mr. King's monograph as above, and also to Mr. Cole's article in the *Railroad Gazette*, May 19, 1905, page 524.

*(To be continued.)*

## DAILY HOURS OF SERVICE ON GERMAN RAILROADS.

On Oct. 1, 1905, the Prussian-Hessian railroads reduced the maximum number of hours of daily service for engine and train crews from 16 to 15, and on April 1, 1906, extended the reduction to the entire operating personnel. In the early part of 1906 the daily hours of actual work in the shops was reduced from 9½ to 9 hours. Furthermore, especial care has been taken that those employees who alternate weekly in day and night work should have a proper period of rest at the time of change. The hours of daily service required of the different groups of employees according to the schedule in force Oct. 1, 1907, are as follows:

| | Year. | Daily shifts of service of more than— 10 hrs., per cent. | 11 hrs., per cent. | 12 hrs., per cent. |
|---|---|---|---|---|
| Employees in lower grades of station service. | 1900. | 77.90 | 69.53 | 10.12 |
| | 1901. | 79.43 | 70.32 | 10.28 |
| | 1902. | 78.94 | 69.63 | 10.37 |
| | 1903. | 78.02 | 64.16 | 9.14 |
| | 1904. | 77.24 | 57.95 | 8.15 |
| | 1905. | 75.57 | 55.45 | 7.29 |
| | 1906. | 73.08 | 49.36 | 5.99 |
| | 1907. | 68.71 | 43.57 | 5.04 |
| Switching service | 1900. | 64.43 | 43.10 | 1.02 |
| | 1901. | 69.84 | 46.06 | 1.19 |
| | 1902. | 69.12 | 48.95 | 2.22 |
| | 1903. | 64.76 | 32.95 | 2.12 |
| | 1904. | 63.54 | 27.00 | 0.85 |
| | 1905. | 62.63 | 26.04 | 0.60 |
| | 1906. | 50.15 | 17.57 | 0.43 |
| | 1907. | 46.15 | 17.44 | 0.28 |
| Lower grades of track-supervision and maintenance. | 1900. | 97.06 | 91.87 | 21,23 |
| | 1901. | 97.31 | 91.81 | 19.30 |
| | 1902. | 91.31 | 91.16 | 19.68 |
| | 1903. | 97.41 | 89.67 | 16.09 |
| | 1904. | 97.53 | 85.95 | 15.57 |
| | 1905. | 96.36 | 83.08 | 13.23 |
| | 1906. | 91.50 | 72.10 | 9.93 |
| | 1907. | 89.33 | 66.58 | 7.45 |

| | Year. | Average daily hours of service— 8 hrs. or less, per cent. | 8-9 hrs., per cent. | 9-10 hrs., per cent. | 10-11 hrs., per cent. |
|---|---|---|---|---|---|
| Locomotive service. | 1900. | 3.12 | 14.93 | 53.74 | 28.21 |
| | 1901. | 2.37 | 14.44 | 54.92 | 28.27 |
| | 1902. | 2.04 | 11.95 | 54.84 | 31.17 |
| | 1903. | 1.84 | 16.65 | 67.15 | 14.46 |
| | 1904. | 2.38 | 15.82 | 69.93 | 11.87 |
| | 1905. | 2.44 | 19.03 | 67.82 | 10.71 |
| | 1906. | 3.65 | 22.23 | 65.08 | 9.04 |
| | 1907. | 4.65 | 23.45 | 64.09 | 7.81 |
| Train service | 1900. | 0.49 | 3.81 | 21.32 | 74.38 |
| | 1901. | 0.44 | 2.83 | 26.46 | 70.27 |
| | 1902. | 0.60 | 2.64 | 25.15 | 71.61 |
| | 1903. | 1.43 | 6.95 | 35.48 | 56.14 |
| | 1904. | 1.58 | 7.09 | 38.87 | 57.46 |
| | 1905. | 1.38 | 7.78 | 40.13 | 50.71 |
| | 1906. | 1.47 | 9.14 | 41.75 | 47.64 |
| | 1907. | 2.15 | 11.42 | 43.80 | 42.63 |

The decrease in the daily hours of duty has been accompanied by an increase in the monthly days of rest, so that the following percentage of the members of some of the principal groups have at least two days of rest during each month.

| Year. | Grades of station service— Medium, per ct. | Lower, per ct. | Switching, per cent. | Track inspect'n and maint., per cent. | Service— Locomotive, per cent. | Train, per ct. |
|---|---|---|---|---|---|---|
| 1900 | 82.36 | 82.61 | 90.72 | 78.34 | 98.73 | 96.74 |
| 1901 | 84.56 | 83.90 | 91.08 | 76.85 | 99.62 | 97.04 |
| 1902 | 84.92 | 84.91 | 92.20 | 77.98 | 99.63 | 95.81 |
| 1903 | 90.02 | 89.78 | 96.28 | 86.64 | ..... | ..... |
| 1904 | 91.84 | 90.79 | 97.02 | 87.66 | ..... | ..... |
| 1905 | 93.34 | 91.84 | 97.75 | 87.93 | 100.00 | 100.00 |
| 1906 | 95.68 | 92.11 | 98.05 | 88.97 | ..... | ..... |
| 1907 | 96.42 | 93.62 | 96.87 | 93.18 | ..... | ..... |

| Service groups. | Number of employees. | Number of employees subject to the schedule. Up to and incldg 8 hrs. No. | Per cent. | 8 to 10 hrs. No. | Per cent. | 10 to 12 hrs. No. | Per cent. | 12 to 14 hrs. No. | Per cent. | 14 to 15 hrs. No. | Pr cent. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium grades of station service | 12,267 | 3,227 | 26.31 | 5,843 | 47.63 | 3,079 | 25.10 | 118 | 0.96 | ..... | ..... |
| Lower grades of station service | 37,819 | 5,953 | 15.75 | 5,879 | 15.54 | 24,078 | 63.67 | 1,841 | 4.86 | 68 | 0.18 |
| Switching | 10,107 | 3,008 | 29.76 | 2,435 | 24.09 | 4,636 | 45.87 | 28 | 0.28 | ..... | ..... |
| Car inspection | 2,830 | 89 | 3.14 | 1,161 | 41.02 | 1,577 | 55.73 | 3 | 0.11 | ..... | ..... |
| Locomotive service | 37,156 | 5,973 | 16.07 | 11,689 | 31.46 | 10,722 | 28.86 | 7,212 | 19.41 | 1,560 | 4.20 |
| Train service | 44.749 | 5,793 | 12.95 | 11,818 | 26.41 | 17,675 | 39.49 | 7,343 | 16.41 | 2,120 | 4.74 |
| Lower grades of track superv. & maint. | 34,799 | 785 | 2.26 | 2,925 | 8.41 | 28,496 | 81.88 | 2,496 | 7.17 | 97 | 0.28 |
| All other employees | 275,442 | 22,461 | 8.16 | 169,578 | 61.57 | 81,937 | 29.74 | 1,442 | 0.52 | 24 | 0.01 |
| Total | 455,169 | 47,289 | 10.39 | 211,328 | 46.43 | 172,200 | 37.83 | 20,483 | 4.50 | 3,869 | 0.85 |

The longer hours of service are not to be understood as being performed by the same individuals, but rather by members of the same group as necessity arises.

As compared with former years the shortening of the time worked daily is shown in the table below giving the percentage of the total employees working 10 hours or more.

| Year. | Daily shifts of service of more than— 10 hrs., per cent. | 11 hrs., per cent. | 12 hrs., per cent. |
|---|---|---|---|
| 1900 | 52.26 | 29.99 | 8.68 |
| 1901 | 53.77 | 30.46 | 8.78 |
| 1902 | 53.00 | 29.62 | 7.87 |
| 1903 | 50.76 | 26.36 | 7,26 |
| 1904 | 50.53 | 24.58 | 6.99 |
| 1905 | 49.33 | 23.12 | 6.49 |
| 1906 | 45,96 | 20.96 | 5.77 |
| 1907 | 43.18 | 19.23 | 5.35 |

Similar figures covering the same period of time and applying to some of the groups of employees compare as follows:

| | Year. | Daily shifts of service of more than— 10 hrs., per cent. | 11 hrs., per cent. | 12 hrs., per cent. |
|---|---|---|---|---|
| Employees in medium grades of station service. | 1900. | 47.04 | 27.92 | 4.62 |
| | 1901. | 47.60 | 26.73 | 4.13 |
| | 1902. | 46.32 | 25.80 | 4.32 |
| | 1903. | 43.02 | 23.14 | 3.98 |
| | 1904. | 39.56 | 18.97 | 2.68 |
| | 1905. | 36.45 | 16.10 | 2.09 |
| | 1906. | 28.98 | 12.10 | 1.36 |
| | 1907. | 26.06 | 10.55 | 0.96 |

Sweden has for some years experimented with electrical operation of sections of its railroads, in hopes to find in the abundant water power of parts of the country a substitute for much of the coal which it must import. On one of these sections, with a central station, near Stockholm, the experiment has been abandoned and the poles removed. But preparations are made for electrical working on other sections, and among others on the Ofoten Railroad in the extreme north, almost exclusively used for carrying iron ore to a Norwegian port north of the Arctic circle, and where coal ought to be cheap, as the vessels carrying ore can get hardly any other return cargo.

# General News Section.

Another road—the Boston & Maine—has begun proceedings in the federal court to test the power of the Interstate Commerce Commission to require monthly reports showing violations of the federal hours of labor law.

In Indianapolis it is reported that retail tradesmen, said to be acting on requests of railroad employees who are their customers, are signing petitions to the Interstate Commerce Commission in favor of an increase of 10 per cent. in freight rates.

The Louisiana State Railroad Commission, acting under a law passed by the last legislature of that state, has ordered the construction of a connecting track at Eunice, to join the railroads at that place. The order affects five different companies.

It is reported in Denver that a number of the prominent railroads in Colorado have combined to abolish the issue of free transportation to "homeless persons." The requests of charitable institutions in favor of such persons are being refused.

The Canadian Railway Commission is to be enlarged by the appointment of two more members, making a board of five. Among the candidates mentioned for the place is C. W. Spencer, an officer of the Canadian Northern, and formerly of the Canadian Pacific.

The proposition to have a special report upon the desirability of extending the Western & Atlantic Railroad to the Atlantic ocean which was passed in the lower house of the Georgia legislature, was rejected by the Senate and the project therefore is dead for the present.

The Georgia legislature, the annual session of which has just ended, passed a law requiring railroads to use electric headlights on the locomotives of all through trains. Representatives of the railroads say that the law will be resisted as unconstitutional on account of non-compliance with the regulations relating to bills which are passed in one House and rejected in the other, and which subsequently are changed by one House or the other. The legislature also passed a bill providing for the punishment of telegraph companies which may fail to promptly deliver a telegram.

A press despatch from Washington says that General Manager Melcher, of the Chicago, Rock Island & Pacific, has reached an agreement with certain discontented telegraphers on his road. The grievances of the operators were discussed in a conference at which the government arbitrators, Messrs. Knapp and Neill, were present. The principal grievance of the operators appears to have been that the company had required some of them to work "broken tricks," part of the time in the morning and part in the evening, thus keeping the hours within the requirements of the law, and in some cases avoiding the necessity of employing additional men.

The Public Service Commission of New York state, First district, has issued an order requiring the New York Central & Hudson River to largely increase its force of watchmen at the crossings on its line, used mostly by freight trains, in Eleventh avenue, New York City. This line extends from Thirty-fourth street northward to Sixtieth street, about one and one-fourth miles. Trains run in the middle of the street, at very low speed, yet many pedestrians have been injured by trains. By the order now issued, six of the 25 streets crossing Eleventh avenue must have watchmen at all times, and at one of these, Forty-second street, there must be two men at all times. At seven streets no watchmen are required, and at the others the order lengthens the hours during which watchmen must be in attendance.

President Ralph Peters, of the Long Island Railroad, threatens to make public the names of the owners of automobiles which are run at excessive speed over crossings of his road. There has been much reckless driving on Long Island, and the railroad officers have been powerless to stop it. In a count recently made, it was shown that of the 310 automobiles passing over a certain crossing where a flagman is stationed, 121 were run over the tracks without any regard for the crossing signal or the flagman. Several of this number barely escaped trains, and one driver cursed the flagman for trying to stop him. The rest of the automobiles approached at reduced speed; 11 were stopped by the presence of trains and six drivers came to a full stop voluntarily. It is proposed to continue the watching and to record and publish the numbers of the vehicles; which will make possible the discovery of the owners' names.

Reports from the Pennsylvania Railroad's Western Pennsylvania Division—embracing those lines terminating in the Pittsburgh District—show that since January 1 of this year 4,200 employes engaged in the operation of trains on that division have received instructions in rendering first aid to the injured. About twelve lectures are given each month by the medical examiners of the Relief Department. Employees are taught how to place injured persons on stretchers, and how to carry the injured. They likewise learn to take primary care of wounds, fractures, burns, and shock, without the use of drugs, until competent medical aid can be obtained. The Pennsylvania has furnished stretchers to all baggage, mail, express, work and wrecking cars, terminals, yard offices, shops and important stations. Locomotives, cabin cars, terminals, yard offices, shops, and important stations are supplied with the "First Aid" boxes, which contain bandages, compresses and safety pins. Up to the present time about 25,000 men have received instructions.

## Canadian Pacific Strike.

It is reported in Montreal that the Canadian Pacific is engaging men in England to take the place of the shop men who have struck. Considerable numbers of new men have already been employed, and it is said that some of these have come from the United States. A few from Vancouver, who went to work at Winnipeg August 14, were Japanese. The company has denied the assertion of the strikers that contracts in violation of the law were being made with workmen in the United States to take positions in Canada. On the night of August 9 windows were maliciously broken in a large number of passenger cars at Winnipeg. On August 17 the company announced that it would at once engage mechanics to fill all of the vacancies, opening employment agencies in all the principal cities of Canada.

The circumstances leading up to this strike are succinctly stated by a correspondent at Winnipeg who writes:

The men who struck were the machinists, boilermakers and their helpers, the car inspectors, the car repairers and the shop laborers. The shops of the Canadian Pacific are manned by the International Association of Machinists, and while business was brisk they repeatedly secured increases until on August 1st they were receiving two cents an hour more than is paid in the St. Paul territory. The locomotive engineers, conductors and other classes receive the same rates as those in force on railroads running west of St. Paul. When the depression came on the company, reluctant to reduce wages generally or to take the radical step of introducing piece work in the west, decided to introduce a sliding scale.

The unions, which had contracts subject to termination on 30 days' notice, were given notice on the 1st of April that 30 days from that date the contracts would be canceled; and in May notices were posted in all the shops containing a set of rules which were substantially the same as those formerly in force, with a few exceptions, designed to cure certain abuses. The rules stated that the foremen would regulate the wages, the maximum being the same as before, but the minimum five cents less. This sliding scale applied only to journeymen, and not to helpers or other classes earning small pay.

For operating purposes the Canadian Pacific is divided at Fort William. The Operating Department has separate managements east and west of that point, and wage schedules

have always been made separately. The first counter move of the unions was to have the men on the Eastern lines ask for a new schedule and a nine-hour day, they having previously worked 10 hours for a day, while the men in the west worked on a nine-hour day. Next they threw the whole matter at the government, requesting that an Arbitration Board be formed, under what is called the Lemieux Act. The men named as their arbitrators the Vice-President of the union, although the Lemieux Act distinctly states that no one having an interest in the dispute shall act as an arbitrator. The road designated a lawyer as its arbitrator, and the government named a Registrar (a kind of a Judge) as a third. When the railroad officers here consented to appoint an arbitrator, they did so on the understanding that Eastern and Western lines would be dealt with separately; but once the board was convened, the chairman decided to include Eastern lines. The road then withdrew its arbitrator. The government appointed one in his place, and asked the road to go ahead.

The three arbitrators got together, and heard complete evidence on both sides, after which they rendered a decision. According to this decision the number of apprentices was increased from one in five men to one in four men. They abolished the rule requiring that two machinists be sent out to wrecks, and they placed the boilermakers in three classes, the first to be paid the present rate of 43½ cents an hour, the second 40 cents, and the third—tubers—33 cents. The award permitted "lap hours" in roundhouses; that is that a certain portion of the staff might start at 7 o'clock and another portion at 8 o'clock so as to work nine-hour days, and avoid overtime, and they eliminated what is known as the shop committee, under which arrangement the company heard the men's grievances on the company's time.

Out of about 8,000 men, this decision reduced the wages of less than 200, but the men considered it a blow at the unions; so, notwithstanding that they had applied for the conciliation board, they struck.

The principal newspapers and the public generally are with the road in this fight, the press coming out boldly with editorials. Prominent citizens express the opinion that unless the company stands firm it might as well turn the road over to the men.

From Toronto it is reported that the Brotherhood of Locomotive Firemen has a grievance and has applied to the Dominion Government for the appointment of an arbitration board.

## The Pennsylvania Coal and Coke Receivership.

On August 15, Thomas H. Watkins was appointed Receiver of the Pennsylvania Coal & Coke Railway. The Receiver has issued the following statement:

"Owing to the severe depression in the bituminous coal trade resulting from panic the Pennsylvania, Beech Creek & Eastern Coal Co., the lessee of the property of the Pennsylvania Coal & Coke Co., was unable to meet its rental obligations. These rentals included the payment of all interest and sinking fund requirements and the payment on a sliding scale of dividends on the stock of the lessor company.

"The Pennsylvania, Beech Creek & Eastern Coal Co. having defaulted on these rentals, the bondholders of the Pennsylvania Coal & Coke Co. considered it expedient to require the trustees under their mortgage to apply for a receiver, with authority to resume possession of the property and continue its operation, and this step has been taken in the interest of all concerned.

"The Pennsylvania Coal & Coke Co. has a comparatively small floating debt, and arrangements are under way for procuring advances of money sufficient for the conservation and operation of the property.

"I see no reason why the Pennsylvania Coal & Coke Co., if its property is kept intact and in operation, should not earn enough to take care of all its obligations. The contracts now on the books of the Pennsylvania, Beech Creek & Eastern Coal Company, the late lessee, which will be filled by the Pennsylvania Coal & Coke Co., amount to more than 3,000,000 tons. With a valuable property and improving business conditions, and having a reasonable time to work the situation out with the co-operation of all parties interested, I hope to avert the danger of any loss to the security holders."

The Receiver has applied for permission to borrow $500,000 to meet the interest on underlying bonds and to pay taxes.

## Expenses of Railroad Operations.*

A feature that visibly increases the expenses of railroad operations without in any way augmenting its earnings, is the tremendous cost of material at the present time. The following two statements, one from the Chicago, Rock Island & Pacific and the other from the Atchison, Topeka & Santa Fe, show the change during the last ten years.

AVERAGE PRICES OF MATERIALS.
*Chicago, Rock Island & Pacific Railroad.*

| | Year 1897. | Year 1907. |
|---|---|---|
| Wheels, No. 600, each | $5.68 | $9.30 |
| Rail, gross tons | 27.63 | 28.00 |
| Ties, average for treated and untreated | .3378 | .90* |
| Coal ton | 1.64 | 2.05 |
| Waste | .0625 | .0525 |
| Spikes, cwt. | 1.69 | 1.90 |
| Angle bars, cwt. | 1.29 | 1.65 |
| Track bolts, cwt. | 1.97 | 2.45 |
| Cast-iron pipe, net ton. | 20.75 | 25.00 |
| Engines: | | |
| Cars, coal (60 tons capacity) each | 600.00 | 1,14[illegible] |
| Cars, box (60 tons capacity), each | 506.65 | 1,225.83 |
| Billets, steel, tons | 15.50 | 29.50 |
| Cut nails, cwt. | 1.10 | 1.95 |
| Tank plates, cwt. | 1.25 | 1.95 |
| Beams, cwt. | 1.35 | 1.85 |
| Refined bar iron, cwt. | 1.10 | 1.85 |
| Wire nails, cwt. | 1.35 | 2.00 |
| Castings, iron, tons. | 25.70 | 35.00 |
| Wood (engine), cords. | 2.19 | 2.11 |
| Brass castings, cwt. | 9.11 | 16.25 |
| Oil (headlight), gals. | .0775 | .08 |

*Treated; and .52 each untreated.

COST OF MATERIALS.
*Atchison, Topeka & Santa Fe Railroad.*

| | 1897. | 1907. | Increase, per cent. |
|---|---|---|---|
| Sawn ties | $0.18 | $0.39 | 116.5 |
| Hewn ties | .19 | .35 | 84.2 |
| Lumber, lowest grades | 10.50 | 17.50 | 70.0 |
| Lumber, highest grades | 17.75 | 23.90 | 36.8 |
| Rails | 18.00 | 30.36 | 68.6 |
| Spikes | 1.27 | 2.00 | 36.1 |
| Track bolts | 2.20 | 2.80 | 27.3 |
| Tie plates | .04 | .12375 | 173.4 |
| 61-lb. angle splices | .25 | .29 | 18.0 |
| Rock, ballast | .50 | .60 | 20.0 |
| Bar iron | 1.20 | 1.70 | 41.6 |
| Sheet steel | 1.50 | 1.76 | 17.7 |
| Cast iron | 1.55 | 1.46 | 58.7 |
| Wheels, 600 lbs. | 6.00 | 7.00 | 16.6 |
| Stock brass | 12.00 | 28.00 | 133.3 |
| Nails | 1.45 | 2.00 | 37.9 |
| Coal | 1.14 | 1.65 | 44.7 |

## Fire Fighting Locomotives at Pittsburgh.

For the purposes of fire protection the Pennsylvania Railroad now has 17 locomotives in the Pittsburgh district equipped with fire hose and pumping machinery. During the past 20 years, the insurance records of the company show that considerable good has been accomplished by the fire fighting locomotives and the number is now being largely increased. The apparatus has been simplified and the amount of hose carried has been increased by substituting linen for cotton rubber-lined hose.

The territory between Pittsburgh and Swissvale, eight miles, has been divided into five districts, with a designated alarm signal for each section. The fire signals are on the block signal towers. When a fire is discovered, the alarm for the district is sounded, and all engines within that district must immediately drop the work on which they may be engaged, and hurry to the fire. It is the duty of the block signal man to keep the tracks open whenever an alarm is sounded, so that the engines can reach the fire without unnecessary delay.

In the districts protected are the Pittsburgh Passenger Yard, the Local Freight Yards at Denny Curve, the Wilkinsburg Yard, the buildings at Duquesne Freight Station, at Grant Street, 26th Street, Shadyside, East Liberty, Wilkinsburg and Swissvale stations. About 6,000 freight cars are handled in the Pittsburgh district every day, while approximately 1,500 cars are standing at the above points all the time. Every member of the switching crews has been specially trained in the handling of fire apparatus, and all of the men are required to test

*From an address on Railroad Taxation by Thos. Mellersh, Comptroller, Northwestern Pacific Railroad, before the California State Board of Equalization at Sacramento, July 28, 1908.

the apparatus on the engines at least once a week. Likewise, each engineman, when going on duty every day, examines his pump and hose, to satisfy himself that they are working properly. Drills are also conducted at intervals to maintain the efficiency of the organization.

### Railroad Painters' Convention.

The thirty-ninth annual convention of the Master Car and Locomotive Painters Association will be held at Atlantic City, N. J., from September 8 to 11, inclusive. This association is doing some creditable service for the railroad interests of the country, especially in the experimental tests of materials and devising methods of painting railroad equipment with the view of economy and durability. It seems that those railroads whose painters do not belong to this association are losing many opportunities. This association was organized in 1870. The subjects will include: "Cracked, Painted and Varnished Surfaces. Can they be treated successfully without burning off? By what methods?" Essay, "What benefit has been derived by the use of so-called Chinawood Oil in the manufacture of paints and varnishes?" "What advancement has been made in the painting of steel cars?" "Hustling locomotives through the shop." "What system of 'ordering in' cars for shopping is recommended as productive of best results as to paint and varnish?" "Has any substitute been produced that may be safely used in place of turpentine in painting?" "Is it good policy to leave the sash and doors in cabs while locomotives are passing through the shop for general repairs?" "What fire precautions are best adapted for the Railway Car and Locomotive Paint Shop?" "What basis of measurement is best adapted to the piece work operations performed on railroad passenger train cars?"

### Cost of the Panama Canal.

There has been spent in building the Panama canal up to June 1, 1908, $72,948,007, of which $43,043,289 was spent prior to July 1, 1907.

Expenditures have been made on the following accounts:

| | |
|---|---|
| Civil administration | $2,145,515 |
| Sanitation | 6,720,843 |
| Construction and Engineering | 28,332,966 |
| Municipal improvements | 5,646,349 |
| Plant account | 30,102,334 |

These figures are solely for construction and do not include the purchase of the French franchise, nor the indemnity paid to Colombia.

### Cost of the Great Pyramid in Detroit.

E. S. Wheeler, member of the Detroit Engineering Society, presented at a recent meeting of that society plans and specifications on which he estimated in detail the cost of reproducing in Detroit the Great Pyramid of Gizeh. The first paragraph of the specifications is as follows: "The Detroit pyramid shall be a complete and exact copy of the pyramid of Gizeh as it was when first built and before it had been broken into and desecrated by early barbarian kings or later civilized antiquarians. The material of the Detroit pyramid must, where possible, be the same as that of the old; if not, it must be equally good, as determined by the Detroit Engineering Society." The original dimensions of the Great Pyramid were: Length of side, 760 ft.; height, 485 ft.; area of base, 13.25 acres. Mr. Wheeler estimates the cost, exclusive of site or foundation, as follows:

| | | |
|---|---|---|
| 3,313,000 cu. yds. | backing stone at $8.50 | $28,160,500 |
| 140,000 " | facing stone at $57.00 | 7,980,000 |
| 2,000 " | granite facing at $100.00 | 200,000 |
| | Total | $36,340,500 |

### Car Doors.

Much is made in the settlement of claims of seals and seal records as between roads. On the 17th of January, 1907, a man confessed and named 26 persons implicated in stealing from cars at East St. Louis. All were employees, and some had the duty, among other things, of reporting on the seals of the cars received by the road. It is not the purpose of this paper to discuss the adjustment of claims. But many men, trusted and well paid, have proved false to their trusts, have steadily stolen and successfully covered their trails for long periods, adding volume to this great stream. Should we not remove some of the temptation by having better car doors?—*S. D. Webster, St. Louis.*

## Traffic News.

The Delaware, Lackawanna & Western will henceforth send its lake freight west from Buffalo by the Western Transit Company, instead of by the boats of the Union Steamboat Line.

The State Railroad Commission of Ohio has authorized the railroads terminating at lake ports to suspend at their option demurrage charges on coal for lake shipments during the remainder of this year.

The secretary of the recently organized Transportation Bureau of the Montreal Board of Trade is W. S. Tilston, heretofore Chief Clerk to the Import Freight Agent of the Canadian Pacific in Montreal.

Pittsburgh papers report that on August 13 the Baltimore & Ohio carried excursions out of Pittsburgh destined to Atlantic City filling 38 cars, part of them sleeping cars; and that on the next day the Pennsylvania took 52 carloads for the same destination.

The Delaware, Lackawanna & Western has enlarged its New York freight facilities by establishing a new station at the foot of Catherine street, East river, which will be opened September 1. Cars will be taken on floats daily to and from the railroad terminal at Hoboken.

In the first full week in August the coal mines along the line of the Pittsburgh & Lake Erie shipped 6,000 carloads of coal, which is said to be 218 cars more than in any week before. The coal movement on this road is now within 15 per cent. of that of last year, and is greater than the movement of 1906.

A shipment of silk which reached New York by express August 11, coming by way of the Canadian Pacific from Vancouver, came from Yokohama in 21 days, having left that port July 21. The same shippers sent consignments the same day by two other lines, one of which landed the silk in New York August 14 and the other August 15.

At Tacoma, Wash., recently the Northern Pacific paid a fine of $980 for delivering some bonded freight to the consignee instead of to the United States customs officers. The freight was a carload of matting imported at Tacoma and sent to Indianapolis. The duty on the matting was $490, and the mistake in delivering was by law punishable by a fine equal to twice the amount of the duty. Although the error was made at Indianapolis, the fine had to be paid by the initial railroad.

The State Railroad Commission of Alabama on Saturday last filed with the Interstate Commerce Commission a complaint against the 13 principal railroads in the Southeastern States, alleging that the advances in freight rates which have been announced by the South-Eastern Freight Association will impose an excessive tax on the people of Alabama. The principal charge in the complaint is that the railroads have entered into a conspiracy in restraint of trade, and it is declared that the freight tariffs agreed upon by the roads suppress all competition.

The Harbor Commissioners of Montreal have made a reduction of about 7½ mills a bushel in the charge for transshipment of grain at that port from freight cars to ocean vessels. The grain exporters of New York City have for several weeks been complaining that the rates on export grain through Montreal were much lower than through New York, Boston and ports south of those cities. But now comes this reduction at Montreal made for the purpose, it is said, of meeting New York, Philadelphia and Boston competition! The latest phase of the complaint in New York is that the port's misfortunes are due not so much to the narrow views of the railroad officers as to excessive port charges.

## INTERSTATE COMMERCE COMMISSION.

### Rates on Oranges and Vegetables from Florida.

*Florida Fruit and Vegetable Shippers' Protective Association v. Atlantic Coast Line et al. Opinion by Commissioner Prouty.*

Florida oranges compete during at least part of the season directly with California oranges in eastern markets. Rates on oranges from Florida are constructed by naming a rate from certain points in the north of Florida, known as base points, to northern markets, and adding to this the local rate from the point of production to the base point. Oranges are shipped to New York by all water, water and rail and all-rail routes. The rail and water rates from the base points to Baltimore, Philadelphia and New York are 35 cents per box; to Boston, Mass., 40 cents per box. The all-rail rate per box is 47.5 cents to Baltimore, 48.5 cents to Philadelphia, 50.5 cents to New York and 58.5 cents to Boston. There is no carload rate. To this rate must be added the local rate from the producing point to the base point. This local rate averages about 25 cents per box. Thus the rate from interior Florida points is about 75.5 cents to New York, with a haul of 1,242 miles; while the rate from Los Angeles, Cal., is 82.8 cents per box, with a haul of 3,149 miles. The rate from California to all points east of the Missouri river and north of the Ohio and Potomac rivers is the same. Florida oranges weigh about 8 lbs. more per box than California oranges, and do not keep as well.

The local rate from the producing point to the basing point is fixed by the Florida State Commission and is as low as is reasonable. Rates on oranges from Florida base points to territory north of the Ohio river ought not to be higher on the average than from California, but the establishment of a blanket rate for that territory is not justified. Present rail and water rates on vegetables from Florida base points to Northwest cities are found to be excessive, and a rate of not more than 25 cents per crate of 50 lbs. to Baltimore, Philadelphia and New York is ordered and a rate of not more than 30 cents to Boston. The minimum carload rate established for the transportation of strawberries from Florida shipping points to the northern market should be reduced from 200 crates per car to 175 crates per car. The refrigeration charges on fruit and vegetables from Florida to northern markets is found to be not unreasonable.

## STATE COMMISSIONS.

### Wisconsin. Carload Rate on Shipment of Mixed Grain Upheld.

*New Richmond Roller Mills Co. v. Chicago, St. Paul, Minneapolis & Omaha.*

The petitioner shipped from Knapp to New Richmond a car containing a certain quantity of wheat and rye, of which the total weight was 43,950 lbs., the wheat and rye being shipped in bulk and separated in the car by partition. The defendant's tariff contains the following provision: "On mixed carload shipments of grain, carloads may be forwarded at the rate named [carload rate], provided all the articles or all the articles but one are sacked." The shipment of rye and wheat does not meet the requirements of this provision and should have been refused by the defendants, but as it was accepted it is only reasonable to charge the carload rate on the shipment, and the defendant's tariff should be so changed as to permit of such a shipment as the one in this case being made at carload rate.

### Wisconsin. Classification of Fish Boxes Determined.

*New York Fish Co. v. Chicago, Burlington & Quincy.*

The petitioner has been paying twice first-class rate on empty fish boxes shipped from LaCrosse to points on the Mississippi river. The Western Classification, No. 43, provides for "refrigerator and fish boxes N. O. S. L. C. L., second class; C. L. fourth class, minimum 24,000 lbs." On May 1 this was changed so as to read: "Refrigerator boxes and refrigerator fish boxes N. O. S., minimum C. L. weight 24,000 lbs.; L. C. L., second class, C. L. fourth class." Fish boxes are not specifically provided for, but one item in the Western Classification provides for carriers N. O. S., which must mean all carriers not otherwise provided for in the classification. There also appears the item "wooden boxes N. O. S. any quantity, fourth class." The facts brought out in this case suggest with renewed force the desirability of undertaking a comprehensive and fundamental revision of the existing classifications. The classification of fish boxes is unreasonable, the following classification is reasonable and just: Fish boxes new, used for shipment between points in Wisconsin in less than carload lots, second class; carloads, fourth class, minimum weight 24,000 lbs.; fish boxes returned, any quantity, fourth class.

### Freight Rates and Prosperity in Alabama.

At Gadsden, Ala., where the shops of the Alabama Great Southern have been closed for some time, the citizens, desiring to see a return of "prosperity," sent an inquiry to Vice-President T. C. Powell, of the railroad company, asking when the shops would be reopened. To the editor of the *Gadsden Journal*, who wrote the letter, Mr. Powell replied that he should be glad to reopen the shops if he could see a prospect of sufficient revenue to justify him in doing so; and then he went on to give a few facts on the other side of the question. The railroads desired to make a small advance in freight rates and they gave notice in June, two months before the time proposed for putting the increased rates in effect, but complaint was made to the United States court and an injunction was issued, although the roads before deciding the question had waited nine months after the beginning of the depression in business hoping that conditions would revive. The injunction was granted by Judge Speer, July 25. It was, however, superseded by an order from Judge Pardee on August 5, and the increases have now been put into effect. Estimating by the average consumption of wheat in the United States, Mr. Powell calculates that the advance in the rate of freight on flour amounts to 5½ cents per capita per annum, and he thinks that the other advances which have been made will not increase the burden on each citizen to more than 25 cents a year; and he declares that more than this sum has already been saved to the people of the South by the reductions in passenger rates which have been put into effect within the past year. Mr. Powell then explains the philosophy of rate making in considerable detail, saying, among other things:

"It must not be understood that the traffic interests of any large railroad are dependent upon the intelligence of only one or two men. Every railroad has a large number of traffic representatives. These men are stationed in different parts of the country. The larger the railroad the more representatives it has and the more complete are its means of obtaining information as to business conditions, not only for the present, but for the future as far as they can be predicted.

"Furthermore, through the medium of traffic associations and regular meetings of these traffic associations the officials of the different railroads interchange views and discuss conditions, so that the official of one road really has the benefit not only of the information furnished by his own representatives but the information furnished by representatives of all other lines interested in the same traffic. By this means errors of judgment of one man are corrected by the information obtained by another. With the possible exception of the business agencies such as Dun's or Bradstreet's, there is no more complete organization in the country than the traffic organization of the railroads.

"The information as to the business conditions is obtained not only from the traffic representatives stationed at the large commercial centers, but the status of trade in the smaller places is ascertained through traveling representatives, while immediately upon the railroad itself the actual business offering for shipment day by day, the requests for cars and the detailed operation of the road constitute a barometer which is invaluable.

"In the attempted regulation of railroad rates through Legislative action, the mistake is made of assuming that there is always available a large volume of traffic ready to move. Of course, large commercial centers constantly produce freight of one kind or another, but this freight may not move in the direction of every railroad except in limited quantities."

## REPORT OF EARNINGS AND EXPENSES OF RAILROADS.

MONTH OF JUNE, 1908.

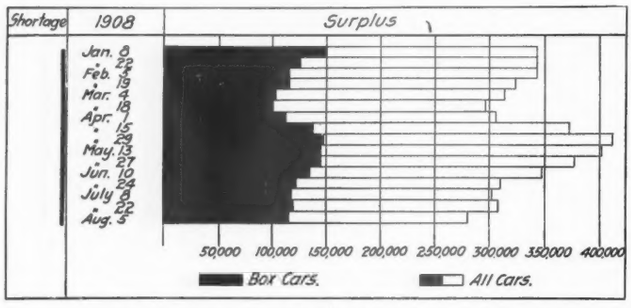
See also issue of August 14.

| Name of road. | Mileage operated at end of period. | Operating revenues: Freight. | Passenger. | All other revenue from transportation. | From operations other than transportation. | Total operat'g revenues. | Operating expenses: Maintenance: Way and structures. | Of equipment. | Traffic. | Transportation. | General. | Total operating expenses. | Net operating revenues (or deficit). | Taxes. | Operating income (or loss). |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama & Vicksburg | 143 | $58,593 | $37,280 | $9,531 | $1,126 | $106,530 | $20,035 | $21,409 | $3,234 | $42,285 | $4,435 | $91,398 | $15,132 | $3,600 | $11,532 |
| Boston & Maine | 2,242 | 1,730,039 | 1,129,685 | 202,861 | *16,983 | 3,045,602 | 381,155 | 348,950 | 55,350 | 1,452,091 | 70,835 | 2,308,381 | 737,221 | 146,136 | 591,085 |
| Chicago, Rock Island & Pacific | 7,402 | 2,173,434 | 1,273,093 | 486,868 | 29,274 | 3,962,669 | 682,923 | 69,751 | 110,281 | 1,592,912 | 104,269 | 2,560,136 | 1,402,533 | 145,683 | 1,256,850 |
| Cincinnati Northern | 248 | 58,810 | 17,124 | 4,256 | 545 | 80,735 | 18,752 | 10,486 | 2,623 | 28,110 | 2,744 | 62,715 | 18,020 | 4,000 | 14,020 |
| Cleveland, Lorain & Wheeling | 194 | 363,944 | 17,331 | 5,765 | 16,972 | 404,012 | 38,997 | 50,797 | 5,956 | 111,365 | 4,588 | 211,703 | 192,309 | 9,878 | 182,431 |
| Eastern Ry. of New Mexico | 221 | 46,657 | 30,320 | 2,765 | 978 | 80,720 | 20,627 | 12,887 | 607 | 21,795 | 1,321 | 57,237 | 23,483 | 4,705 | 18,779 |
| Florida East Coast | 584 | 152,819 | 57,382 | 41,775 | 2,640 | 254,616 | 87,382 | 50,438 | 4,963 | 83,258 | 13,399 | 239,440 | 15,176 | 13,046 | 2,130 |
| Fort Smith & Western | 217 | 17,099 | 11,687 | 2,460 | 1,803 | 33,049 | 17,318 | 9,648 | 1,388 | 16,770 | 2,402 | 47,526 | †14,477 | 812 | *15,289 |
| Fort Worth & Denver City | 454 | 212,675 | 114,309 | 32,689 | 1,033 | 360,706 | 65,139 | 46,579 | 8,276 | 112,378 | 14,770 | 247,142 | 113,564 | 12,817 | 100,747 |
| Galveston, Harrisburg & San Antonio | 1,343 | 525,875 | 177,574 | 34,553 | 6,449 | 744,451 | 115,475 | 29,881 | 22,068 | 340,566 | 25,074 | 533,064 | 211,387 | 58,681 | 152,706 |
| Georgia Southern & Florida | 395 | 73,348 | 44,392 | 19,230 | 625 | 137,595 | 7,919 | 30,240 | 5,429 | 64,203 | 7,392 | 115,183 | 22,412 | 7,382 | 15,030 |
| Green Bay & Western | 225 | 32,409 | 14,458 | 3,248 | 76 | 50,191 | 7,558 | 8,573 | 397 | 13,624 | 1,543 | 31,695 | 18,496 | 2,526 | 15,970 |
| Gulf & Ship Island | 307 | 92,801 | 26,994 | 5,541 | 1,526 | 126,862 | 36,180 | 26,067 | 1,270 | 56,895 | 7,170 | 127,582 | †720 | 4,615 | *5,335 |
| Hocking Valley | 347 | 361,766 | 68,229 | 18,685 | *60 | 448,621 | 30,572 | 67,592 | 7,624 | 129,374 | 12,575 | 247,737 | 200,884 | 17,736 | 183,148 |
| Houston & Texas Central | 789 | 215,562 | 135,540 | 4,725 | 9,805 | 365,633 | 49,423 | 137,142 | 7,758 | 173,663 | 11,759 | 379,745 | †14,112 | 37,425 | *51,537 |
| Houston, East & West Texas | 191 | 53,098 | 27,207 | 247 | 2,297 | 82,850 | 17,436 | 19,160 | 1,024 | 26,376 | 2,079 | 66,075 | 16,775 | 5,100 | 11,675 |
| Illinois Central | 4,594 | 2,684,450 | 883,224 | 482,837 | 24,522 | 4,075,033 | 414,893 | 197,898 | 87,460 | 1,486,352 | 97,664 | 2,284,267 | 1,790,766 | 171,158 | 1,619,608 |
| Indianapolis Southern | 179 | 58,672 | 19,513 | 2,919 | 285 | 81,389 | 24,141 | 15,128 | 979 | 31,909 | 1,294 | 73,451 | 7,938 | 3,963 | 3,975 |
| Midland Valley | 324 | 34,397 | 14,318 | 4,002 | 841 | 53,558 | 25,243 | 16,752 | 1,518 | 21,977 | 4,112 | 69,602 | †16,044 | 4,083 | *20,127 |
| Minn., St. Paul & Sault Ste. Marie | 2,310 | 525,868 | 240,118 | 60,541 | 94,225 | 920,752 | 125,043 | 99,938 | 19,570 | 287,859 | 17,907 | 550,317 | 370,435 | 55,245 | 315,190 |
| Nashville, Chattanooga & St. Louis | 1,230 | 546,185 | 184,604 | 46,145 | 4,564 | 781,548 | 83,613 | 103,729 | 35,561 | 328,302 | 24,029 | 575,234 | 206,314 | 13,920 | 192,394 |
| New Orleans & North-Eastern | 196 | 152,446 | 40,595 | 11,538 | 2,931 | 207,510 | 24,950 | 31,708 | 7,513 | 72,395 | 8,098 | 144,664 | 62,846 | 6,500 | 56,346 |
| Pere Marquette | 2,360 | 683,632 | 270,680 | 68,408 | 13,825 | 1,036,545 | 134,934 | 140,808 | 32,595 | 446,153 | 32,915 | 787,405 | 249,140 | 52,345 | 196,795 |
| Quincy, Omaha & Kansas City | 262 | 32,437 | 14,206 | 4,968 | 2,303 | 53,914 | 16,349 | 8,199 | 1,434 | 26,162 | 2,323 | 54,467 | †553 | 2,250 | *2,803 |
| Rio Grande Southern | 180 | 37,067 | 10,660 | 3,622 | 96 | 51,445 | 9,080 | 4,258 | 140 | 13,543 | 1,320 | 28,341 | 23,104 | 1,897 | 21,207 |
| St. Louis, Brownsville & Mexico | 442 | 49,413 | 24,211 | 3,987 | 1,671 | 79,285 | 12,920 | 8,145 | 3,225 | 36,552 | 4,235 | 65,077 | 14,205 | 3,000 | 11,205 |
| St. Louis Southwestern | 773 | 347,758 | 79,335 | 20,309 | 8,901 | 456,303 | 67,152 | 73,396 | 21,081 | 140,433 | 21,087 | 323,149 | 133,154 | 15,025 | 118,129 |
| St. Louis Southwestern of Texas | 697 | 197,172 | 62,665 | 18,635 | 2,623 | 281,095 | 92,623 | 54,700 | 7,184 | 147,468 | 13,146 | 315,121 | †34,026 | 9,166 | *43,192 |
| Terminal R.R. Ass'n of St. Louis | 26 | ..... | 206 | 204,077 | 2,285 | 206,568 | 17,215 | 16,541 | 412 | 60,020 | 5,746 | 99,934 | 106,634 | 23,396 | 83,237 |
| Texas & New Orleans | 450 | 178,692 | 63,010 | 14,026 | 6,015 | 261,743 | 27,542 | 31,435 | 6,255 | 116,085 | 7,646 | 188,963 | 72,780 | 19,867 | 52,913 |
| Toledo, Peoria & Western | 248 | 69,614 | 31,233 | 5,686 | 465 | 106,998 | 18,039 | 17,800 | 1,911 | 34,783 | 3,105 | 75,638 | 31,360 | 3,456 | 27,904 |
| Vicksburg, Shreveport & Pacific | 171 | 54,073 | 38,963 | 8,322 | 2,784 | 104,142 | 23,476 | 16,463 | 3,194 | 36,521 | 4,004 | 83,658 | 20,484 | 5,800 | 14,684 |
| Wabash | 2,515 | 1,293,616 | 516,764 | 329,346 | 7,741 | 2,147,467 | 226,222 | 344,688 | 64,657 | 776,266 | 53,588 | 1,465,421 | 682,046 | 63,255 | 618,791 |
| Yazoo & Mississippi Valley | 1,371 | 404,534 | 154,582 | 34,390 | 6,329 | 599,835 | 107,955 | 115,082 | 14,312 | 296,529 | 21,808 | 555,686 | 44,149 | 29,936 | 14,213 |
| TWELVE MONTHS OF FISCAL YEAR, 1908. | | | | | | | | | | | | | | | |
| Alabama & Vicksburg | 143 | $933,841 | $462,558 | $99,390 | $14,972 | $1,510,761 | $257,888 | $275,102 | $37,465 | $566,058 | $53,992 | $1,190,505 | $320,256 | $40,605 | $279,651 |
| Boston & Maine | 2,242 | 22,486,065 | 13,537,388 | 23,210,083 | 646,213 | 38,990,749 | 4,756,446 | 4,760,813 | 512,662 | 18,621,959 | 702,317 | 29,354,197 | 9,636,552 | 1,712,273 | 7,924,279 |
| Chicago, Rock Island & Pacific | 7,402 | 35,190,832 | 15,729,714 | 3,329,280 | 354,290 | 54,604,116 | 7,750,371 | 7,127,725 | 1,396,274 | 22,114,938 | 1,265,810 | 39,655,118 | 14,948,998 | 1,693,048 | 13,255,950 |
| Cincinnati Northern | 248 | 681,196 | 189,334 | 45,918 | 6,024 | 922,472 | 234,286 | 138,802 | 30,784 | 342,842 | 27,027 | 773,741 | 148,731 | 44,472 | 104,259 |
| Cleveland, Lorain & Wheeling | 194 | 3,685,174 | 235,638 | 69,289 | 169,453 | 4,159,554 | 516,811 | 723,101 | 72,409 | 1,395,260 | 61,550 | 2,769,131 | 1,390,423 | 116,624 | 1,273,799 |
| Eastern Ry. of New Mexico | 221 | 488,719 | 355,488 | 36,104 | 9,166 | 889,477 | 180,454 | 98,659 | 9,060 | 244,243 | 31,382 | 563,798 | 325,679 | 43,880 | 281,799 |
| Florida East Coast | 584 | 1,373,214 | 1,065,182 | 507,809 | 62,141 | 3,008,346 | 619,989 | 486,763 | 84,974 | 1,091,784 | 103,574 | 2,387,084 | 621,262 | 131,593 | 489,669 |
| Fort Smith & Western | 217 | 418,807 | 195,688 | 27,201 | 68,596 | 710,292 | 176,745 | 126,377 | 10,034 | 216,688 | 30,205 | 560,049 | 150,243 | 13,563 | 136,680 |
| Fort Worth & Denver City | 454 | 2,766,273 | 1,599,687 | 192,253 | 16,582 | 4,574,795 | 729,583 | 580,074 | 83,316 | 1,480,371 | 155,097 | 3,028,441 | 1,546,354 | 137,387 | 1,408,967 |
| Galveston, Harrisburg & San Antonio | 1,343 | 7,822,859 | 2,261,214 | 414,009 | 58,769 | 10,556,851 | 1,367,459 | 1,518,092 | 278,282 | 4,924,553 | 291,437 | 8,379,823 | 2,177,028 | 506,339 | 1,670,689 |
| Georgia Southern & Florida | 395 | 1,078,111 | 656,305 | 218,512 | 10,617 | 1,963,545 | 224,007 | 384,169 | 63,060 | 825,802 | 99,565 | 1,596,603 | 366,942 | 92,626 | 274,316 |
| Green Bay & Western | 225 | 399,233 | 153,552 | 45,941 | 2,703 | 601,429 | 113,330 | 100,556 | 4,335 | 176,070 | 23,495 | 417,786 | 183,643 | 24,686 | 158,957 |
| Gulf & Ship Island | 307 | 1,518,881 | 428,008 | 85,928 | 33,510 | 2,066,327 | 530,545 | 336,642 | 15,710 | 714,976 | 88,365 | 1,686,238 | 380,089 | 46,334 | 333,755 |
| Hocking Valley | 347 | 4,779,685 | 837,327 | 200,385 | 24,366 | 5,841,763 | 759,651 | 1,308,363 | 85,425 | 1,796,244 | 133,526 | 4,083,209 | 1,758,554 | 224,667 | 1,533,887 |
| Houston & Texas Central | 789 | 3,906,429 | 1,738,029 | 58,201 | 61,421 | 5,764,080 | 708,720 | 837,473 | 166,721 | 2,379,825 | 215,272 | 4,398,011 | 1,366,069 | 230,402 | 1,135,667 |
| Houston, East & West Texas | 191 | 814,665 | 345,779 | 2,684 | 15,121 | 1,178,249 | 239,158 | 133,526 | 15,891 | 437,896 | 39,417 | 865,888 | 312,361 | 55,293 | 257,068 |
| Illinois Central | 4,594 | 35,357,811 | 10,991,798 | 6,113,571 | 367,247 | 52,830,427 | 6,758,173 | 9,310,136 | 1,207,476 | 19,489,220 | 1,128,474 | 37,893,479 | 14,936,948 | 2,190,173 | 12,746,775 |
| Indianapolis Southern | 179 | 611,986 | 227,682 | 36,692 | 5,758 | 882,118 | 255,107 | 122,951 | 13,735 | 397,337 | 17,027 | 806,157 | 75,961 | 28,255 | 47,706 |
| Midland Valley | 324 | 752,685 | 225,775 | 41,096 | 11,675 | 1,031,231 | 263,845 | 183,862 | 20,120 | 329,396 | 48,608 | 845,831 | 185,400 | 31,813 | 153,587 |
| Minn., St. Paul & Sault Ste. Marie | 2,310 | 7,828,851 | 2,681,222 | 699,129 | 300,655 | 11,509,857 | 1,330,856 | 1,361,625 | 235,675 | 4,119,837 | 199,009 | 7,247,002 | 4,262,855 | 696,908 | 3,565,947 |
| Nashville, Chattanooga & St. Louis | 1,230 | 7,610,813 | 2,464,115 | 588,269 | 75,056 | 10,738,253 | 1,475,530 | 1,976,575 | 400,944 | 4,060,292 | 268,759 | 8,182,100 | 2,556,153 | 242,740 | 2,313,413 |
| New Orleans & North-Eastern | 196 | 2,080,983 | 595,750 | 138,806 | 49,775 | 2,865,314 | 369,193 | 549,439 | 86,599 | 1,016,552 | 98,252 | 2,120,035 | 745,279 | 75,331 | 669,948 |
| Pere Marquette | 2,360 | 9,380,223 | 3,308,489 | 881,971 | 121,193 | 13,691,876 | ‡1,658,834 | §2,043,043 | 306,096 | 6,104,379 | 314,439 | 10,426,791 | 3,265,085 | 553,239 | 2,711,846 |
| Quincy, Omaha & Kansas City | 262 | 467,554 | 181,960 | 50,417 | 10,971 | 710,902 | 205,548 | 132,529 | 19,686 | 324,027 | 35,027 | 716,817 | †5,915 | 28,043 | *33,958 |
| Rio Grande Southern | 180 | 443,773 | 123,945 | 36,982 | 1,053 | 605,753 | 137,369 | 43,657 | 1,436 | 179,407 | 17,503 | 379,372 | 226,381 | 28,296 | 198,085 |
| St. Louis, Brownsville & Mexico | 442 | 585,305 | 264,349 | 44,188 | 9,537 | 903,379 | 154,747 | 107,682 | 26,820 | 325,095 | 35,083 | 649,427 | 253,952 | 30,391 | 223,561 |
| St. Louis Southwestern | 773 | 4,923,149 | 1,062,500 | 247,163 | 40,840 | 6,273,652 | 819,019 | 924,251 | 243,775 | 1,698,751 | 222,332 | 3,908,128 | 2,365,524 | 183,643 | 2,181,881 |
| St. Louis Southwestern of Texas | 697 | 2,250,651 | 834,245 | 196,022 | 30,477 | 3,311,395 | 982,008 | 659,526 | 101,987 | 1,669,487 | 162,004 | 3,575,012 | †263,617 | 110,143 | *373,760 |
| Terminal R.R. Ass'n of St. Louis | 26 | ..... | 2,624 | 2,228,505 | 33,221 | 2,264,350 | 210,605 | 175,501 | 5,100 | 777,099 | 59,175 | 1,227,480 | 1,036,870 | 267,329 | 769,541 |
| Texas & New Orleans | 450 | 2,663,205 | 847,506 | 185,784 | 34,532 | 3,731,027 | 566,759 | 681,740 | 68,072 | 1,585,762 | 85,466 | 2,987,799 | 743,228 | 182,087 | 561,140 |
| Toledo, Peoria & Western | 248 | 810,046 | 353,499 | 51,323 | 6,612 | 1,221,480 | 232,081 | 261,808 | 22,009 | 456,602 | 37,662 | 1,010,162 | 211,318 | 48,856 | 162,462 |
| Vicksburg, Shreveport & Pacific | 171 | 818,057 | 494,335 | 95,850 | 19,452 | 1,427,694 | 323,417 | 266,829 | 37,756 | 507,250 | 47,783 | 1,183,035 | 244,659 | 69,950 | 174,709 |
| Wabash | 2,515 | 17,103,693 | 6,470,678 | 2,028,081 | 137,622 | 25,740,074 | 2,728,235 | 4,359,313 | 860,069 | 10,240,198 | 655,933 | 18,843,748 | 6,896,326 | 727,470 | 6,168,856 |
| Yazoo & Mississippi Valley | 1,371 | 7,029,208 | 2,040,040 | 424,152 | 87,234 | 9,580,634 | 1,945,771 | 1,499,950 | 196,250 | 3,968,314 | 234,680 | 7,844,965 | 1,735,669 | 413,186 | 1,322,483 |

Includes adjustment of depreciation: ‡ $3,022; § $473,718.
*Loss.
†Deficit.

### Car Surpluses and Shortages.

In presenting Statistical Bulletin No. 29 of the Committee on Car Efficiency, Arthur Hale, chairman, says: "The figures for dates prior to August 5 have already been published in Bulletin No. 27-A. The total of surplus cars for the date of this report is 281,621, a decrease of 27,059 since the last




Car Surpluses and Shortages in 1908.

fortnightly report. Of this decrease 6,505 are box cars, 21,195 coal and gondola, while surplus flat cars increased about 1,000. Shop reports indicate an increase of about 5,000 in the number of bad order cars, leaving a net improvement of 22,000 cars. The increase in bad order cars is not necessarily an indication of lack of activity in car repairs, but is probably due to the transfer of cars from the available to the shop column on account of defects developing when cars are taken from storage tracks for restoration to service."

Car Surpluses and Shortages, Bi-Weekly, from October 30, 1907, to August 5, 1908, Inclusive.

| Date. | Number of roads. | Surpluses. Box. | Flat. | Coal, gondola and hopper. | Other kinds. | Total. | Shortages. Box. | Flat. | Coal, gondola and hopper. | Other kinds. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| August 5, 1908 | 163 | 114,075 | 15,404 | 104,544 | 47,598 | 281,621 | 371 | 56 | 30 | 178 | 635 |
| July 22, 1908 | 166 | 120,580 | 14,401 | 125,739 | 47,960 | 308,680 | 115 | 37 | 330 | 27 | 509 |
| June 24, 1908 | 163 | 123,112 | 18,042 | 130,149 | 41,995 | 313,298 | 266 | 34 | 120 | 31 | 451 |
| May 27, 1908 | 160 | 144,697 | 20,075 | 162,695 | 54,437 | 381,904 | 82 | 13 | 12 | 18 | 125 |
| April 29, 1908 | 159 | 147,971 | 24,350 | 186,742 | 54,542 | 413,605 | 145 | 42 | 16 | 64 | 267 |
| March 18, 1908 | 160 | 103,509 | 25,122 | 119,205 | 49,206 | 297,042 | 533 | 151 | 250 | 73 | 1,007 |
| February 19, 1908 | 161 | 113,776 | 30,088 | 134,217 | 44,432 | 322,513 | 697 | 141 | 249 | 162 | 1,249 |
| January 22, 1908 | 161 | 124,622 | 27,328 | 142,338 | 48,292 | 342,580 | 392 | 132 | 79 | 135 | 738 |
| December 24, 1907 | 158 | 87,714 | 14,740 | 64,556 | 42,300 | 209,310 | 187 | 81 | 191 | 265 | 724 |
| November 27, 1907 | 160 | 16,246 | 3,645 | 10,028 | 10,429 | 40,348 | 11,908 | 868 | 2,964 | 2,224 | 17,964 |
| October 30, 1907 | 161 | 786 | 600 | 1,285 | 1,275 | 3,946 | 61,592 | 3,546 | 15,987 | 9,632 | 90,757 |

### The Uniform Bill of Lading.

It is said that certain railroads have asked the Interstate Commerce Commission to change the time for the adoption of the uniform bill of lading, and that the Commission has complied with the request, making the date November 1. The Commission in its decision, has recommended the adoption of the new bill on September 1; the present proposal is to make the date January 1.

The American Bankers' Association, according to the bulletin of the association recently issued, is satisfied with the forms recommended by the Commission; but this accomplishment is regarded as only the beginning of the changes in freight shipping which members of the association desire to secure; and it is urged that agitation be kept up for better laws to provide against fraud in matters which cannot be covered by the bill itself. The bankers' committee takes credit for the following improvements which have now been made available by the adoption of the new forms:

1. Two separate forms of bills of lading, on different colored paper, one for straight and one for order shipments.

2. The prominently printing of the words "order of" before the name of the consignee of order bills.

3. The omission of the words "not negotiable" from order bills and the printing of such words on straight bills.

4. The amendment of the alteration clause so that a fraudulently altered bill shall be good for its original tenor and not destroyed completely.

5. The addition, at the end of Section 3 of the conditions (which provide that the carrier, liable for loss, shall have the benefit of any insurance) of the words "so far as this shall not avoid the policies or contracts of insurance."

The Philadelphia Commercial Exchange has asked the cooperation of other trades bodies in a protest against certain features of the uniform bill of lading. It is contended that the shrinkage feature is unjust to grain shippers who complain that they will have to pay freight on grain they do not get.

# Equipment and Supplies.

## LOCOMOTIVE BUILDING.

*Sander & Co.* have ordered two locomotives from the Baldwin Locomotive Works.

*Newell & Bryant* have ordered one locomotive from the Baldwin Locomotive Works.

*G. W. Irwin & Co.* have ordered one locomotive from the Baldwin Locomotive Works.

*The Baturite Railway* is having two locomotives built by the Baldwin Locomotive Works.

*Krajewski-Pesant & Co.* have ordered one locomotive from the Baldwin Locomotive Works.

*The Iowa Central* has ordered two switching locomotives from the Baldwin Locomotive Works.

*The Colorado-Utah Construction Co.* has ordered four locomotives from the American Locomotive Co.

*The Woodward Iron Co.*, Woodward, Ala., has ordered one locomotive from the Baldwin Locomotive Works.

*The Central Northern Railway* of Argentine has ordered six locomotives from the Baldwin Locomotive Works.

*The El Paso & Suburban* has ordered one light passenger locomotive from the Davenport Locomotive Works.

*The Gideon & North Island* has ordered one 30-ton and one 20-ton locomotive from the Davenport Locomotive Works.

*The Columbia Sugar Co.*, Cartagena, Republic of Columbia, has ordered one four-wheel (0-4-0) locomotive from the Davenport Locomotive Works.

*The Archibald Coal Co.*, Archibald, Pa., has ordered one four-coupled and trailing (0-4-2) light locomotive from the Davenport Locomotive Works.

*The Michigan Central*, as reported in the *Railroad Age Gazette* of August 14, has ordered three Pacific (4-6-2) locomotives from the Montreal Locomotive Works, Ltd.

*General Dimensions.*

| | |
|---|---|
| Weight, total | 235,000 lbs. |
| " on drivers | 146,000 " |
| " on engine truck | 46,000 " |
| " on trailer truck | 43,000 " |
| " tender | 145,000 " |
| Cylinders | 22 x 26 in. |
| Boiler, working steam pressure | 200 lbs. |
| Firebox, length | 108 in. |
| Firebox, width | 75¼ " |
| Tubes, number | 394 |
| " outside diameter | 2 in. |
| " length | 21 ft. |
| Wheel base, driving | 13 ft. |
| " " total, engine | 33 ft. 7½ in. |
| " " total, engine and tender | 62 " 11 " |
| Water capacity | 7,000 gals. |

*The Nepigon Construction Co.*, Nepigon, Ont., has ordered

one four-wheel saddle tank locomotive from the Davenport Locomotive Works. This locomotive will be equipped with Davenport steam-brakes and Westinghouse air-brakes.

*The Canadian Pacific*, as reported in the *Railroad Age Gazette* of August 14, has ordered 10 ten-wheel (4-6-0) locomotives to be built at the Angus shops, for delivery in September and October.

*General Dimensions.*

| | |
|---|---|
| Weight, total | 190,000 lbs. |
| Weight on drivers | 141,000 " |
| Cylinders | 22½ x 28 in. |
| Diameter of drivers | 63 " |
| Boilers, type | Wagon top |
| " working steam pressure | 180 lbs. |
| " heating surface | 2,418 sq. ft. |
| Tubes, number | 264 |
| " outside diameter | (240) 2-in.; (24) 5-in. |
| " length | 14 ft. 3 in. |
| Firebox, material | Otis steel |
| " length | 8 ft. 6⅛ in. |
| " width | 5 " ⅞ " |
| Grate area | 40 sq. ft. |
| Water capacity | 5,000 Imp. gals. |
| Coal capacity | 10 tons |

*Special Equipment.*

| | |
|---|---|
| Air brakes | Westinghouse |
| Axles | Mild steel |
| Bell | Little Giant |
| Brake-beams | Simplex truss |
| Brake-shoes | Can. Pac. standard |
| Couplers | Tower |
| Headlights | Can. Pac. standard, electric |
| Injectors | Hancock |
| Safety valves | World |
| Lubricators | Detroit, 5-feed |
| Springs | Can. Pac. standard. |
| Steam gages | Star vertical |
| Steam heating equipment | Gold, Leslie reducing valve |
| Tires | Krupp |
| Wheel centers | Cast steel |
| Superheater | Vaughan-Horsey |

## CAR BUILDING.

*The Illinois Central* is asking prices on 15 coaches.

*The Columbus Railway & Light Co.* is in the market for 10 large cars.

*The Walla Walla Traction Co.* has ordered two cars from the J. G. Brill Co.

*The Chicago, Lake Shore & South Bend* has ordered 10 cars from the J. G. Brill Co.

*The Chesapeake & Ohio* has ordered 12 four-wheel cabooses from the American Car & Foundry Co.

*The Tri-City Railway & Light Co.*, Davenport, Iowa, has ordered six interurban cars from the Danville Car Co.

*The Peet Brothers Co.*, Kansas City, Kan., has ordered four 8,000-gal. capacity tank cars from the Bettendorf Axle Co.

*The Lewiston, Augusta & Waterville Street Railway*, Lewiston, Me., has ordered eight double-truck cars from the J. G. Brill Co.

*The Laark Mercantile Co.*, St. Louis, Mo., is in the market for one gasolene motor car, to accommodate from five to ten passengers.

*The West Penn Railways (Electric)*, Connellsville, Pa., is having seven suburban cars built by the Cincinnati Car Co. They will be 52 ft. 8 in. long over all.

*The Capital Traction Co.*, Washington, D. C., is having 12 semi-convertible cars built by the Cincinnati Car Co. The cars will be 28 ft. long over corner posts.

*The Iowa Central* has ordered 200 thirty-ton box cars and 250 forty-ton gondola cars from the Mt. Vernon Car Manufacturing Co., instead of the American Car & Foundry Co., as reported in the *Railroad Age Gazette* of July 17. Bids are now being received on 13 caboose cars and 50 steel dump cars, contracts for which will be placed soon.

*The Delaware, Lackawanna & Western*, as reported in the *Railroad Age Gazette* of July 31, has ordered 15 suburban coaches and five passenger and baggage cars from Barney & Smith. These cars will be equipped with National cam curtain fixtures instead of Forsythe automatic fixtures, as reported, and with National sash balance and lock window fixtures. This special equipment is made by the National Lock Washer Co.

## IRON AND STEEL.

*The Delaware, Lackawanna & Western* has ordered 400 tons of tie plates from the Pennsylvania Steel Co.

*The Seattle Electric Co.*, Seattle, Wash., has ordered 1,000 tons of rails from the Pennsylvania Steel Co.

*The Western Pacific* has ordered from 3,000 to 4,000 tons of structural steel from the Ft. Pitt Bridge Works for use in bridge construction.

*The Northwestern Elevated*, Chicago, has ordered 1,200 tons of structural steel from the Morava Steel Construction Co., Chicago, to be used in building the stub terminal.

*The Chicago City Railway* has given a contract to the Lorain Steel Co. for the special track work, to cost about $28,000, to be installed in the Archer avenue barns. The Pennsylvania Steel Co. was given an order for 80 tons of tie plates for track relaying in Chicago.

## RAILROAD STRUCTURES.

ARGENTINE, KAN.—The Atchison, Topeka & Santa Fe has begun the erection of shops to cost approximately $50,000. The buildings will be of steel construction, one story high. The old shops at Argentine were destroyed by fire about one year ago, since which time the machine work has been handled in a temporary structure.

BRIDGEPORT, CONN.—The contract for the erection of two reinforced concrete car barns for the electric lines of the New York, New Haven & Hartford has been awarded to C. H. Blakeslee & Sons, of New Haven, Conn. Work will be commenced at once. The contract calls for barns which will cost $250,000, to be completed by January 1.

BROWNSVILLE, TEX.—The recent visit to Brownsville of Mexican capitalists in company with officials of the St. Louis, Brownsville & Mexico, it is thought may result in the early building of the international bridge across the Rio Grande river here. The United States government has at last given its consent to the building of this bridge. (July 10, p. 500.)

CHICAGO, ILL.—The Northwestern Elevated has given the contract to the Brennan Construction Co. for building its stub terminal in Chicago.

CLEVELAND, OHIO.—The Detroit & Cleveland and the Cleveland & Buffalo Steamship companies have had plans prepared by the Vorce Engineering Co., Cleveland, Ohio, for a new passenger and freight depot to cost about $150,000. The property upon which the proposed structure will be erected belongs to the city and if a satisfactory rental can be agreed upon work will be begun at once.

DILLON, MONT.—The Oregon Short Line has given a contract to the Campbell Construction Co., of Salt Lake City, Utah, for a new $50,000 depot. It is expected that work will be begun at once.

EDMONTON, ALB.—The contract for building the substructure of the Grand Trunk Pacific bridge across the Penbina river, it is said, has been let to John Gunn & Sons, of Winnipeg. This bridge will be 230 ft. high and 1,000 ft. long. (R. R. G., Jan. 10, p. 72.)

KANSAS CITY, KAN.—Plans for the new bridge to be built across the Kaw river near its mouth in Kansas City by the Edgewater Terminal Co., which is an auxiliary of the Missouri Pacific, have been filed with the authorities at Washington, D. C., for approval. The plans call for a $400,000 steel structure. It is to be built to conform to the height and width of the river surveys made for the 734-ft. channel by the government engineers.

MILWAUKEE, WIS.—The Chicago & Milwaukee (Electric) has been granted a permit by this city for building a $50,000 car barn, 68 ft. x 248 ft. The new barn will have accommodations for 22 large interurban cars.

MINNEDOSA, MAN.—A fire on August 16 destroyed the engine

house, freight office and four locomotives belonging to the Canadian Pacific.

Quebec, Que.—The Canadian Government has appointed a board of bridge engineers to prepare plans for the rebuilding of the Quebec bridge. The board consists of H. E. Vautelet, C.E., of Montreal, Que., Chairman; M. Fitzmaurice, of London, Eng., and Ralph Modjeska, of Chicago. The present piers and substructures will be used for the new bridge if their condition permits.

San Francisco, Cal.—D. H. Burnham & Co., Chicago, have made the plans for a union passenger station. All the roads interested have not as yet come to an agreement, the Ocean Shore and Southern Pacific companies, it is said, having not taken definite action.

Seattle, Wash.—The Chicago, Milwaukee & St. Paul has taken out a permit to build a dock and warehouse at 2719 Whatcom avenue, to cost $50,000.

Tampa, Fla.—Receivers of the Seaboard Air Line, it is said, have awarded contracts for terminal improvements involving an expenditure of $500,000. Work is now under way and the contracts call for completion by January 1.

## SIGNALING.

The contract for block signals for the elevated tracks on the Williamsburgh bridge has been awarded to the Union Switch & Signal Company, New York City. The specifications call for 12 signals, nine home and three distant, of cast iron; the home signals showing red and green, the distant signals showing yellow and green. (Aug. 7, p. 691.)

## SUPPLY TRADE NOTES.

The Meacham & Wright Co., Chicago, dealer in cement, has moved its offices from the Chamber of Commerce building to room 805, Corn Exchange Bank building.

F. P. Van Horne has been appointed Assistant Treasurer of the Pressed Steel Car Co., New York. He was formerly Secretary to President Hoffstot, which position will be filled by J. H. King.

The Clark Car Co., Pittsburgh, Pa., has made no statement concerning its business, and a recent article in a morning newspaper is without foundation, so far as the company, or its president, is concerned.

The Sargent-Hollingshead Co., Chicago, has been incorporated in Illinois to manufacture and sell railroad equipment and supplies. The incorporators are: G. H. Sargent, A. G. Hollingshead and W. C. Boyden.

R. E. Masters, formerly with the Marshall Car Wheel & Foundry Co., Marshall, Tex., has been elected Manager of the Houston Car Wheel & Machine Co., Houston, Tex. The latter company is the new name for the Waterman Car Wheel & Foundry Co., which recently amended its charter.

The Baird Railway Steel Tie Co., Topeka, Kan., has purchased a foundry building and tract of land at Topeka for $12,500 and will begin the manufacture of steel ties. The officers of the company are: President, Archibald M. Baird, of Topeka; Vice-President, J. W. Butterfield; Secretary, J. L. Atwood, and Treasurer, E. D. Coon.

Christopher Murphy & Co., Chicago, say that the way orders are coming in for Bartley nut and bolt fasteners for repairs on cars indicates that the recommendation of the Master Car Builders' Association at the last convention, of using a nut lock under head of bolt and nut and doing away with the double nut, is meeting with general favor.

Edward H. Llewellyn, Secretary of the Chicago Malleable Castings Co., died on August 16 at Evanston, Ill. He was taken sick in Germany while on a tour of Europe and arrived home about a week ago. He was born in Wales, in 1855. While he was still young his family came to this country and he received his early education in Milwaukee, Wis.

Consul W. Stanley Hollis, of Lourenço, Marquez, S. E. Africa, reports that tenders to supply electric cranes for the Gorjao wharf at that port can be submitted for some months before the final adjudication is made. The consul says that he has forwarded a set of specifications, and upon their receipt by the Bureau of Manufactures they will be loaned to applicants. (Inquiry No. 2,524.)

The Railway Equipment Co., Portland, Ore., has moved its offices from the Chamber of Commerce building to 72 and 74 First street, where they will carry a larger and more complete line of railroad supplies. The change was necessary because this firm, although in business but four years, and in spite of the recent depression, has been doing a large and increasing business throughout the Pacific coast country.

J. N. Richards, for the past 10 years Manager Sales Department of the Standard Paint Co., 100 William street, New York, has resigned. He has made no plans for the future. Mr. Richards entered the employ of the Standard Paint Company 14 years ago. Four years later he was put in charge of the sales department. The products of the company are Ruberoid roofing, insulating and building papers and preservative paints.

The Independent Pneumatic Tool Co., Chicago, announces that it has appointed the firm of H. W. Petrie, Ltd., with offices at 131 Front street, West, Toronto, Ont.; 22 Victoria Square, Montreal, Que., and Vancouver, B. C., as its exclusive agents in the Dominion of Canada. The Canadian representative will carry a complete stock of Thor pneumatic tools and appliances in its various stores and will be able to make prompt delivery.

The Rockwell-Wabash Co., Chicago, has recently received orders from a number of railroads for installing in offices and stations the Cook system of filling tariffs, which it manufactures. Among these are the Atchison, Topeka & Santa Fe; Detroit, Toledo & Ironton; Montana Railroad; Ohio Central, and Hocking Valley. The Cook system, which was invented by C. W. Cook, Assistant General Freight Agent of the Santa Fe, was fully described in the *Railroad Gazette* of February 28, page 293.)

Samuel E. Moore, formerly Auditor of the Pressed Steel Car Co., died at Pittsburgh, Pa., on August 10. He was born in Pittsburgh in 1850 and when 12 years old began work in the freight office of the Pennsylvania. In 1868 he left the railroad and commenced his actual business career with James Wood & Co., iron dealers. Here he acquired a thorough knowledge of accounting. In 1900 he was appointed Auditor of the Pressed Steel Car Co., in which position he served until his death.

The Goldschmidt Thermit Co., New York, is building a new machine shop and foundry, 84 ft. x 90 ft., located in the rear of the present factory in Jersey City, N. J. It will be fitted up for handling more advantageously the extensive repair work which is now being carried on at its works. Traveling cranes are to be installed and every effort will be made to have the building the most complete thermit repair shop in the country. Special attention will be given to the rapid execution of repairs to electric motor cases, truck frames, cast steel gear wheels, crank shafts, and all wrought iron and steel sections, weighing less than 2,000 lbs.

The Ralston Car Works, Omaha, Neb., is now being organized and will be incorporated during the coming week with a capital of $300,000. C. A. Ralston, of the firm of Ralston & LeBaron, Chicago, has given a contract to Fred Peterson, of Omaha, Neb., for grading the site of the proposed car shops. Work will be commenced upon the construction of the buildings as soon as the plans have been completed. Simultaneous with the building of these shops, Ralston & LeBaron will erect car shops at New Orleans, La., under the style of the International Car Co., announcement of which appeared in our issue June 18. The officers of the latter company are: President, C. A. Ralston; Vice-President and General Manager, A. T. LeBaron; Mechanical Engineer, J. C. Fleet; Treasurer, A. Wagatha. The directors include Seeley Dunn, J. E. Conley, E. C. Roddie and John O. Osborn. Both these companies will repair and rebuild wooden freight cars and it is likely that the final plans will include the installation of machinery for repairing steel cars. It is expected the plant at New Orleans will be in operation about October 1.

The Kellogg Car & Equipment Co., Kankakee, Ill., incorporated under the laws of South Dakota with an authorized capital stock of $200,000, has acquired 23 acres of land at Kankakee, between the Cleveland, Cincinnati, Chicago & St. Louis, and Chicago, Indiana & Southern tracks, and about a quarter of a mile east of the main line of the Illinois Central, upon which it is completing tracks and buildings to be equipped with modern machinery to do a general car repairing business. The construction of the plant was begun last April and the plant now has a capacity of 100 cars a week. The principal work of the company consists in making heavy repairs to freight cars, but by fall it expects to be in a position to handle all classes of repair work, both on passenger and freight cars. F. W. Kellogg, the originator and promoter of the Kellogg company, is an experienced car man and has associated with him a corps of experienced men. The officers are: President, Edwin M. Kellogg; Vice-President and Treasurer, F. W. Kellogg; Secretary, L. J. Viersen, and General Manager, E. H. Ward. Mr. Ward was formerly Assistant General Manager of the Ostermann Manufacturing Co., and later Secretary and Treasurer of the Memphis Car Co., Memphis, Tenn. The company has already received a number of contracts for car repairing.

## TRADE PUBLICATIONS.

*Vertical Boring Mill.*—A leaf, perforated for binding, illustrating and describing a Gisholt 42-in. vertical boring mill, is being distributed by the Gisholt Machine Co., Madison, Wis.

*The Exchange.*—The August number of this pamphlet, published by the Standard Paint Co., New York, contains the conclusion of an article on insulating, building and sheathing papers.

*Smith Improved Nut.*—The Railway Specialty & Supply Co., Chicago, has issued Bulletin T-228 illustrating and describing the Smith improved nut, calling attention to its locking features.

*Tie Plates.*—John R. Keller, Pittsburgh, Pa., has just issued a leaflet describing the Keller new tie plate, which is said to be non-rocking and immovable longitudinally on the tie under the track.

*Graphite.*—The August number of this publication of the Joseph Dixon Crucible Co., Jersey City, N. J., contains the fourth chapter of the series of articles by W. H. Wakeman, entitled "Preventing Corrosion of Steam Machinery."

*AMS Brake Equipment.*—The Westinghouse Traction Brake Co., Pittsburgh, Pa., has just issued instruction pamphlet number T 5,035, which contains rules for operating the AMS brake equipment on single, motor and trailer, and motor cars used as trailers.

*Jacks.*—Simplex jacks for railroads and industrial plants, contractors and engineers are described in a pamphlet issued by the manufacturers, Templeton, Kenly & Co., Chicago. Car and track jacks, together with detail parts of various types, are shown. Detail drawings show the mechanism in different stages of operation.

*Bolt and Nut Machinery.*—The Acme Machinery Co., Cleveland, Ohio, has issued an illustrated catalogue, descriptive of its single, double and triple bolt cutting machines, single and double stay bolt cutters, four and six-spindle nut tappers, pointing machines, and its latest improved Acme heading, upsetting and forging machines.

*Air Compressors.*—Bulletin No. 384 describes in detail the National Type "3VS" air compressor manufactured by the National Brake & Electric Co., Milwaukee, Wis. This type of air compressor is designed to furnish a reliable self-contained and readily accessible compressor of medium capacity occupying a minimum amount of floor space.

*Graphite.*—Dixon's Ticonderoga flake graphite is described in an attractive booklet issued by the Joseph Dixon Crucible Co., Jersey City, N. J. Each page of the publication discusses some particular phase of the graphite industry and at the bottom of the page is a testimonial from some consumer which bears upon the subject matter treated on that page.

*Steel and Iron.*—The August stock list of the Scully Steel & Iron Co., Chicago, probably shows as varied an assortment of shapes and sizes of steel and iron products as have ever been brought together in one stock list. This is the result of the consolidation of the complete stocks of the Scully Steel & Iron Co. and Kelly, Maus & Co. Tools and machinery are included, as well as raw material requirements.

*Cube Concrete Mixer.*—The Chicago improved cube concrete mixer, manufactured by the Municipal Engineering & Contracting Co., Chicago, is illustrated and described in their 1908 catalogue containing 64 pages. A feature of the catalogue is a discussion of concrete and its proper mixing. Concrete mixers for special purposes and automatic appliances used in connection with the cube mixers are also described in the catalogue.

*Interlocking Piling.*—Nye's patent interlocking channel bar piling for bridge piers and foundations, caissons, retaining walls, dry docks, cofferdams, etc., is the subject of catalogue No. 4, published by the National Interlocking Steel Sheeting Co., Chicago. A large variety of forms of interlocking steel sheeting are shown, consisting of standard material in which homogeneity of parts insures great strength and economy in transportation, driving, withdrawing and taking apart. A patent puller for withdrawing piling is also illustrated and described.

### Steel Cars in Coal Mines.

Steel mine cars are coming into use in some of the anthracite coal mines in Pennsylvania. They have not as yet been tested sufficiently long to justify any verdict as to their permanent fitness. It is hoped they will effect much needed saving in underground transportation. One of the most recent installations is at the colliery of the Clear Spring Coal Co., at West Pittston, Pa., where 30 of the new cars have been put in operation. As mules have given away to compressed air and electric locomotives, so it now seems necessary, in the opinion of some mining experts, that the wooden car shall be replaced by one more capable of standing the increasing wear and tear, as the hauls from the working places are continually becoming longer.

A steel car of the type adopted at the Pittston colliery costs about twice as much as the average wooden car. Though subject to less ordinary wear, when a steel car is damaged, the cost of repairing it is high. In common with all the improvements which the anthracite mining companies have undertaken in the last few years, the steel cars are introduced not so much with the idea of reducing the cost of mining as of preventing any increased cost. The exhaustion of the more accessible veins, together with the higher prices of labor and materials, has increased the expense of every phase of mining. And, as the companies have to mine deeper and deeper for coal, the tendency will be for the cost to continue to increase.

The real value of steel cars, as compared with wooden cars, cannot be decided until they have been operated throughout a long period. It is all a question of whether the decrease in the expense of maintenance will be sufficient to offset the increase in the original cost.

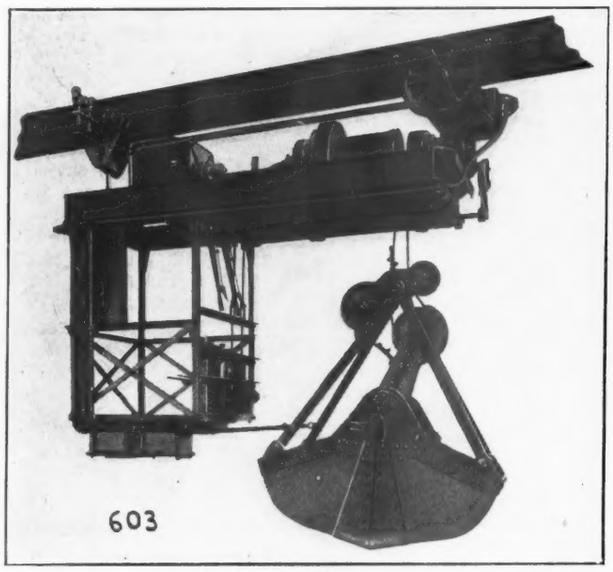
### Grab Bucket Mono-Rail Crane.

The mono-rail crane, illustrated herewith, is for use on an I-beam runway and is provided with swivel trucks, which enable it to round curves of short radii. It is regularly furnished with a two-line grab bucket. Both hoist and hauling drums are operated by one motor, the friction clutches being controlled from the operator's cage. The lowering, as well as the opening and closing of the bucket, is effected by gravity. This method is considered preferable to a crane having a separate motor for the hoist and hauling lines, as the rotative speed of a series motor in lowering the load will not exceed twice the hoisting speed. With the gravity fall any speed of lowering can be attained, the motor being inoperative when the bucket is being lowered or opened. This is important, especially on high lifts. After the bucket has been lowered to the stock pile or car the clutch is closed, after which the clutch for the holding drum is engaged and the two are

utilized for lifting. When the bucket has reached its highest position, it is sustained by a self-lubricating, mechanical brake of the double friction type, thus eliminating the necessity of constant care by the operator and the liability of dropping the bucket should his attention be interrupted.

In order to relieve the hoisting clutches of undue wear during the lowering of the bucket, the hoisting drums are provided with band brakes controlled by foot levers. The friction clutches for raising the load act as safety devices in case of overhoisting, the clutches being so designed that they will slip before the stresses reach the dangerous point. The intermediate hoisting shaft is extended to the rear of the operator's cage and is provided with a drum that rotates at about twice the peripheral speed of the hoisting drum. This drum has attached to it a rope extending to the grab bucket for staying it. The rope is always kept taut by a friction drum revolving between two disks, feather-keyed to the shaft, and held against the drum by spiral springs which vary the pressure between the friction surfaces. The springs exert a pull on the steady rope of from 250 lbs. to 300 lbs.

A racking motor is attached to the driving truck, its speed being regulated by a drum type controller in the operator's cage. The travel of the hoist may be made to suit almost any condition, but in ordinary practice, a speed of from 300 ft. per minute to 500 ft. per minute is sufficient for coal handling




Grab Bucket Mono-Rail Crane.

plants, especially where there is a curve or bend in the I-beam runway. The treads of the driving and trailing truck wheels are made spherical instead of conical. While compactness in a mono-rail crane is desirable, the designer considered it second in importance to accessibility. The design illustrated is considered a very creditable combination of the two features.

Since a coal handling crane of this type is designed principally for light and medium loads and to be operated by unskilled workmen, it must be capable of sustaining large overloads and inconsiderate handling. All parts of the mono-rail hoist are very strong and all wearing surfaces larger than is usually considered necessary without exceeding the weight that is considered standard for hoists of the same rated capacity. The hoist of the type shown herewith was designed to handle from 20 tons to 30 tons of coal per hour from a car or stock pile about 150 ft. from the power house, with a vertical lift of about 60 ft.

The advantages claimed for this class of coal handling machinery are: low cost of handling material, only one man being necessary for all the operations; low cost of installation; a low maintenance charge on account of the small number and sizes of the working parts; large area served, and low power consumption. The mono-rail hoist in the accompanying illustration was designed and built by the Cleveland Crane & Car Co., Wickliffe, Ohio, under the direction of Thomas B. Davis, M.E., Chief Engineer.

## Street and Interurban Association.

The American Street & Interurban Railway Manufacturers' Association will hold its 28th annual convention at Atlantic City, N. J., on Young's Million Dollar Pier, Oct. 12 to 16, inclusive. The committee has prepared a complete plan of the general layout of the building, convention halls, trestle for cars, booths and exhibit spaces. These plans show the exact location of all the exhibit spaces, covering 70,000 sq. ft., which is 10,000 sq. ft. more than the 200 exhibitors used at the convention last year. This additional space is arranged for the coming convention with the expectation that at least 250 exhibitors will require accommodations. About 95 per cent. of the entire exhibit space is in the buildings. Each space will be provided with a complete booth, signs, carpets, etc., ready for unpacking the exhibits on arrival. Power of all kinds will be available without extra charge, terminals being placed in the booths. Aside from the uniform charge of 28 cents per sq. ft., the exhibitor will have only to pay freight, carting, unpacking and installation of his exhibit. Full information in this regard is contained in circulars being sent out by the committee.

The exhibit committee is composed of men from the different lines of business connected with steam railroad and electric railway work. Due to the fact that the railway supply manufacturers are now filling orders for both steam and electric lines, which is fostering a communion of interests among them, there seems little idea that the coming exhibition will be one of electric railway supply men only, but rather that there will be a large number of exhibitors who have hitherto considered only the railroad convention in June. The most telling evidence of this increased general interest is in the new members who have joined the association since the last convention. The usual membership fee of $35 will be in effect this year, which membership includes four official badges, entitling the holder and lady to all the privileges of the convention and all entertainments which may be provided.

The association will use practically the same plans of booths as were used during the recent Master Mechanics' and Master Car Builders' convention. It was generally thought at that time that the arrangement of the booths was far better than at any previous convention. On account of the lateness of the season, the managers of the coming convention have been able to make a more advantageous arrangement and to utilize much more space that is desirable than was the case during the spring convention. The mentioned rate of 28 cents per sq. ft. includes steam, gas, water, compressed air and electricity, the latter at 110 volt and 220 volt a. c., and 220 volt and 550 volt d. c. for all purposes except special lighting and electric signs, power for which will be billed to the consumer at meter rates. The above rate also includes the removal, storage and return to exhibit space of all crates, packing boxes, etc., as well as crex matting on the floors and aisles, burlap for the booth, and the use of 3 in. white enamel letters for signs. There will also be some unboothed space available. Experience during former conventions proved that exhibitors found it more satisfactory and agreeable, as well as more economical, to have their booths erected and ready for occupancy, and to be relieved of the cares incident to booth building. Arrangements have been made with the local civic bodies so that there will be no exorbitant charges for cartage and skilled or unskilled labor, and so that the regular prevailing rates in Atlantic City will obtain.

Those who have been attending the various conventions at Atlantic City are uniformly of the opinion that this city is an ideal convention place. The almost perfect hotel accommodations and with all the amusements incident to a large summer resort, the convention people have found all things most agreeable. The committee will later issue a detailed schedule of hotel rates and other general information. The Marlborough-Blenheim has been selected as the hotel headquarters for the Manufacturers' Association. Due to the fact that Atlantic City has so many hotels and attractions, the members and delegates attending the conventions find it very difficult to locate one or another, and the committee has arranged an in and out booth which provides a registration of the movements of members during the convention. By inquiring of the attendant it will be possible to locate a member at any time, providing his registration is to date. There will

be three or four clerks in the booth, and uniformed call-boys will be in attendance to assist in locating anyone desired. An index card system will be kept and each person upon registering will be given a card upon which he will indicate his intended locations during the week. This card will be filed and can be corrected by personal call at the booth or by telephone. There will be two kinds of registration cards, the white ones indicating to the clerks of the booth that the information thereon can be given to anyone inquiring, while the red cards will indicate that the information is confidential and is to be imparted only to the names on the lower corner of the card. These people will be identified by their badges.

Jos. R. Ellicott, eastern manager Westinghouse Traction Brake Co., New York, is president of the association; K. D. Hequembough, vice-president Franklin Car Heating Co., Syracuse, N. Y., is a vice-president of the association, and in charge of the exhibits, and George Keegan, 2304 Park Row building, New York, is secretary of the association.

# Railroad Officers.

## ELECTIONS AND APPOINTMENTS.

### Executive, Financial and Legal Officers.

W. K. Allen was elected Secretary and Treasurer of the Elgin, Joliet & Eastern, and the Chicago, Lake Shore & Eastern on August 5, succeeding F. D. Raymond, deceased. Mr. Allen was born in Evansville, Ind., in 1868. After a course in the Evansville public schools and the Evansville Commercial College, he entered the service of the Evansville & Terre Haute in March, 1890, as Assistant General Bookkeeper. In 1896 he was appointed Traveling Auditor. Two years later he became Auditor and Car Accountant, and in 1902 was made also Purchasing Agent. In March, 1906, he was appointed Assistant to the General Purchasing Agent of the Rock Island-Frisco Lines. He entered the service of the Elgin, Joliet & Eastern and the Chicago, Lake Shore & Eastern as Special Accountant in July, 1907, from which position he was advanced to his present office.

W. K. Allen

J. M. Hanford, Paymaster of the Southern Pacific, resigned on August 4.

J. L. Pultz has been appointed General Manager of the Birmingham & Gulf Railway & Navigation Co., a new office.

W. F. Sharpe, who recently resigned as Auditor of the Montana Railroad, has gone into the coal business in Helena.

William J. Ingling has been appointed Trainmaster of the Montana division of the Oregon Short Line, with office at Pocatello.

F. L. S. Grundy has been appointed Auditor of Receipts of the Georgia Coast & Piedmont. O. C. Lisman has been appointed Cashier, with office at Darien, Ga.

B. M. Siddall has been appointed Chief Claim Agent of the St. Louis, Brownsville & Mexico, with headquarters at Kingsville, Tex. Effective August 15.

H. H. Collins has been appointed Cashier of the Grand Trunk, with headquarters at Montreal, succeeding A. O. R. Huddell, retired, under the provisions of the pension fund. Henry Herbert Collins was born at Brighton, England, November 25, 1866. He began railroad work on the Grand Trunk in November, 1886, as clerk in the Audit office at Montreal, Que. He was transferred to the Treasurer's office in 1892 and on August 8 was appointed Cashier.

J. R. Dill, recently elected Second Vice-President and General Manager of the Gulf & Interstate of Texas, was born in 1869 in Richmond, Va. He is a graduate of the Virginia Polytechnic Institute and began railroad work as Rodman in the Engineering Department of the Georgia Pacific. The next year he went to the Virginia Nail & Iron Works, in their Engineering Department. In 1890 he was made Rodman of the Baltimore & Ohio, and by 1893 had become Assistant Engineer. From 1893 to June, 1901, he worked in the Traffic Department of the Gulf, Colorado & Santa Fe. In 1901 he was appointed General Freight and Passenger Agent of the Gulf, Beaumont & Kansas City, and two years later was made Commercial Agent of the Gulf, Colorado & Santa Fe. In December, 1905, he was made Assistant General Freight Agent. On January 1, 1908, he was made Superintendent of the Houston Belt & Terminal, which position he held until his recent appointment.

### Operating Officers.

J. W. Guttery has been appointed to the new office of Dining Car Inspector of the Toledo, St. Louis & Western and the Chicago & Alton.

W. Atwill has been appointed Trainmaster of the Cherokee and Omaha divisions of the Illinois Central, at Ft. Dodge, Iowa, succeeding F. M. Jones, resigned.

G. Kydd has been appointed Chief Clerk to W. Downie, General Superintendent of the Atlantic division of the Canadian Pacific. Mr. Kydd succeeds J. G. Shewen, resigned.

A. de Sola Mendes, Auditor of the Georgia Coast & Piedmont, has been appointed General Manager, with office at Darien, succeeding H. D. Emerson, resigned. C. L. Hines has been appointed Trainmaster, with office at Darien.

D. H. Robinson, Trainmaster of the Northern Kansas division of the Missouri Pacific, has been appointed Trainmaster of the Joplin division, with headquarters at Nevada, Mo., succeeding L. B. McGuire, resigned. J. F. Russ succeeds Mr. Robinson, with headquarters at Concordia, Mo. The jurisdiction of R. G. Carden, Trainmaster at Atchison, Kan., has been extended.

W. H. Whalen, the recently appointed Superintendent of the Southern Pacific at Dunsmuir, Cal., was born in 1861 in Auburn, N. Y. He was educated at the high school of the Valparaiso Normal School, Indiana, and afterwards took some courses of the Scranton (Pa.) Correspondence School. He began railroad work November 3, 1882, on the Chicago & North-Western, working as boiler maker for about two years He was, successively, locomotive fireman, engineman and roundhouseman at Chicago. On January 1, 1900, he was made Master Mechanic at Baraboo, Wis. On May 1, 1901, he was transferred to the operating department and made Assistant Superintendent at Oshkosh, Wis. In October, 1902, he was made Superintendent of the Iowa division, where he remained until April 1, 1908. He was then made Superintendent of the North Wisconsin division, which position he held until his appointment on July 15 of the present year.

W. H. Whalen.

F. L. Lewis, who was recently appointed Superintendent of Transportation of the San Antonio & Aransas Pass, with office at San Antonio, Tex., was born in 1866 in London, England. After a London University education he began railroad

work in 1888 with the San Antonio & Aransas Pass as clerk in the office of the Superintendent of Transportation. In 1891 he was appointed Car Accountant and two years later was made Chief Clerk to the Superintendent of Transportation. In November, of the same year, 1903, he was made Assistant Superintendent of Transportation, with headquarters at Yoakum, Tex. In 1906 he was made Superintendent at Yoakum, which position he held until his recent appointment.

### Traffic Officers.

L. H. Sackett, Agent of the Baltimore & Ohio at Foxburgh, Pa., has resigned.

F. J. McDonald has been appointed Traveling Freight Agent of the Southern Pacific in Mexico City, succeeding E. P. Best.

F. M. Patton has been appointed Acting General Freight Agent of the Georgia Coast & Piedmont, with office at Darien, Ga.

T. H. Koerner has been appointed Commercial Agent of the Minneapolis & St. Louis and of the Iowa Central, at Spokane, Wash., a new office.

R. B. Anderson, heretofore Claim Investigator for the St. Louis, Brownsville & Mexico, has been appointed Chief Claim Clerk for the same road.

Ely Ensign, Traveling Passenger Agent of the Texas & New Orleans at Dallas, Tex., has been appointed Traveling Freight and Passenger Agent at Dallas, Tex.

Eugene Saunders has not resigned as Traveling Freight Agent of the Chicago, Burlington & Quincy at St. Louis, Mo., as was announced in these columns recently.

R. R. Waterbury has been appointed Chief Clerk of the Traffic and Auditing departments of the Duluth, Missabe & Northern, with headquarters at Duluth, Minn.

C. A. Asterlin, Northwestern Passenger Agent of the New York, Chicago & St. Louis, has been appointed District Passenger Agent at Minneapolis, effective September 1.

E. H. Ross, Freight Agent of the Atchison, Topeka & Santa Fe, at San Angelo, Tex., has been appointed Transportation Agent at Galveston, Tex. H. E. Everheart succeeds Mr. Ross.

E. M. Gleason, Commercial Agent of the Chicago, Rock Island & Pacific and the St. Louis & San Francisco, has been appointed Secretary of the Dallas Freight Bureau, Dallas, Tex.

R. B. Webb, Commercial Agent of the International & Great Northern at Fort Worth, Tex., has resigned, effective September 1. He is to go into the fire insurance business in San Antonio, Tex.

C. R. Hogle, Commercial Agent of the National Lines of Mexico at Cincinnati, has been appointed Traveling Passenger Agent of the Algoma Central & Hudson Bay and of the Algoma Central Steamship Line.

J. W. Bryan, City Passenger Agent at Milwaukee, Wis., of the Chicago & Alton and the Toledo, St. Louis & Western, has been appointed Traveling Passenger Agent at Pittsburgh, Pa. James Bebe succeeds Mr. Bryan.

H. T. Bowie, Contracting Freight Agent of the Southern Indiana, has been appointed Commercial Agent. W. V. Severns has been appointed Traveling Freight Agent. The headquarters of both are at the Grand Central station, Chicago.

George A. Ruple, whose resignation as Contracting Freight Agent of the El Paso & Southwestern was published in these columns recently, has been appointed Contracting Freight Agent of the Independent Steamship Co., at San Francisco, Cal.

William Heyman has been appointed Export and Import Freight Agent of the Delaware, Lackawanna & Western at New York. He will have charge of the work of the former Foreign Freight Agent at New York, that office having been abolished.

J. E. Weller, whose resignation as Canadian Freight Agent of the Pennsylvania was announced in this column, has been appointed Division Freight Agent of the Pittsburgh, Cincinnati, Chicago & St. Louis at Pittsburgh, Pa., succeeding J. J. Lippincott.

Walter Walthall, City Ticket and Passenger Agent of the Missouri, Kansas & Texas of Texas at Austin, Tex., has been appointed City Ticket and Passenger Agent at San Antonio, Tex., succeeding F. O. Griffin, resigned. R. F. Buford succeeds Mr. Walthall.

H. N. Butterfield, Division Passenger Agent of the Delaware, Lackawanna & Western at Newark, N. J., has been appointed Pacific Coast Freight and Passenger Agent, with office at San Francisco, Cal. The office of Pacific Coast Passenger Agent has been abolished.

Frank Bowman, District Passenger Agent of the Chicago & Alton and of the Toledo, St. Louis & Western at Philadelphia, Pa., has been appointed Eastern Passenger Agent at New York. The office of District Passenger Agent at Philadelphia has been abolished.

J. J. Campion, General Freight Agent of the Atlanta, Birmingham & Atlantic, with headquarters at Atlanta, has resigned, effective September 1. Mr. Campion has been appointed General Freight Agent of the Brunswick Steamship Co., with headquarters at New York.

C. S. Crane, General Passenger Agent of the Wabash, has been appointed General Foreign Passenger Agent. J. D. McNamara, Assistant General Passenger Agent, succeeds Mr. Crane. C. H. Stinson, Assistant General Freight Agent, has been appointed General Freight Agent.

R. C. Brooks has been appointed Commercial Agent of the Central of Georgia, with headquarters at Savannah, Ga., succeeding H. A. Jordan, resigned. George R. Wright has been appointed Commercial Agent of the company at Montgomery, Ala., succeeding R. C. Brooks, transferred.

G. R. Hackley has been appointed General Agent of the Mexican Central and of the National Lines of Mexico at Mexico City. V. M. Gutierrez has been appointed Traveling Freight and Passenger Agent at Mexico City. The separate General and Commercial Agencies of these lines at Monterey, Torreon and Saltillo are abolished.

W. A. Beckler, Northern Passenger Agent of the Cincinnati, New Orleans & Texas Pacific, the Alabama Great Southern, the Alabama & Vicksburg, the Vicksburg, Shreveport & Pacific, and the New Orleans & North-eastern, has been appointed Assistant General Passenger Agent of all these lines. His headquarters will remain in Chicago.

W. E. Davis, Passenger Traffic Manager of the Grand Trunk, has been appointed also Passenger Traffic Manager of the Grand Trunk Pacific, with headquarters at Montreal, Que. G. T. Bell, General Passenger and Ticket Agent of the Grand Trunk, has been appointed also General Passenger and Ticket Agent of the Grand Trunk Pacific, with headquarters at Montreal. J. E. Quick, General Baggage Agent of the Grand Trunk, has been appointed also General Baggage Agent of the Grand Trunk Pacific, with headquarters at Toronto, Ont.

J. Rankin, Agent of the Canadian Pacific at Shanghai, China, has been appointed Agent at Kobe, Japan, succeeding H. T. Wilgres, transferred. A. R. Owen succeeds Mr. Rankin.

R. King, Station Agent of the Canadian Pacific at McAdam Junction, has been appointed Terminal Agent at West St. John, N. B., succeeding J. R. Gilliland, promoted. W. C. S. Paynter, Warehouse Clerk at West St. John, succeeds Mr. King.

W. R. Haldane, the recently appointed General Freight Agent of the Canadian Pacific, was born in 1867 at Galashiels, Scotland. After an education at Upper Canada College, Toronto, Ont., he began railroad work in 1889 with the Canadian Pacific at Chicago. By 1890 he had become Soliciting Freight Agent, and the next year was made chief clerk and Contracting Freight Agent. In 1901 he was made District Freight Agent at Detroit, Mich., which position he held until his appointment August 1.

### Engineering and Rolling Stock Officers.

J. S. Mallard has been appointed Roadmaster of the Georgia Coast & Piedmont, with headquarters at Darien, Ga.

L. C. Brody has been appointed Roundhouse Foreman of the Pennsylvania at Phillipston, Pa., succeeding F. B. McKelvy.

W. C. Hayes, Superintendent of the Erie at Susquehanna, has been appointed Superintendent of Locomotive Operation, with headquarters in New York.

E. T. O'Dowd, Roadmaster of the Atchison, Topeka & Santa Fe at Cleburne, Tex., has been appointed Inspector of Ties at Galveston, Tex. T. J. Pargen, Yard Foreman at Temple, Tex., succeeds Mr. O'Dowd. C. F. Eyster succeeds Mr. Pargen.

Henry Gardner, Apprentice Instructor at McKees Rocks shops at Pittsburgh, Pa., has been appointed Assistant Superintendent of the Apprentices of the New York Central Lines, succeeding W. B. Russell, resigned to become a Director of the "Franklin Union," a technical school in Boston.

H. H. Hale, who has been appointed Master Mechanic of the Gulf & Ship Island, was born in 1871 and began railroad work in 1888 with the Chicago & North-Western under the Superintendent of Motive Power. In 1895 he was appointed Superintendent of Air-Brakes on the Duluth & Iron Range. Later he worked for the Southern Pacific as Division Master Mechanic, and in 1905 was appointed Master Mechanic of the Grand Rapids district of the Pere Marquette. In 1906 he was Consulting Engineer in San Francisco, during the reconstruction following the earthquake, and remained Consulting Engineer until his recent appointment.

C. E. Gossett, Master Mechanic of the Chicago, Rock Island & Pacific at Armourdale, Kan., has been appointed Master Mechanic of the Iowa Central, succeeding T. M. Feeley, resigned. Mr. Gossett was born January 25, 1869, in Kentucky. He received his education at the Missouri State University, after which he began railroad work in 1886 as machinist helper on the Wabash, St. Louis & Pacific, now part of the Wabash. From 1889 to 1891 he was a fireman on the Hannibal & St. Joseph and for the next ten years was an engineman on the Hannibal & St. Joseph, the Wabash and the Chicago, Rock Island & Pacific. From 1901 to 1905 he was Road Foreman of Equipment for the Rock Island, and in the latter year was appointed Master Mechanic at Eldon, Mo., from where he was later transferred to Armourdale, Kan.

### Special Officers.

L. B. Leeming, who has been in charge of the advertising of the Mexican Central, has resigned, effective September 1.

H. E. Grace has been appointed Customs Agent of the Sonora Railway at Nogales, Sonora, Mex., succeeding Alberto Clausen.

### Storekeeper.

H. E. Lind, Storekeeper of the Erie at Kont, Ohio, has been appointed Storekeeper at Susquehanna, Pa., succeeding T. H. Keffor, resigned to engage in other business.

### Purchasing Officers.

W. J. Lawrence, Fuel Agent of the Chicago, Rock Island & Pacific, has resigned and his office has been abolished. Correspondence formerly sent to the Fuel Agent should be sent to Eugene McAuliffe, General Fuel Agent, Chicago.

## OBITUARY.

H. H. Griffiths, Manager of the Boca & Loyalton, died on July 30 at the age of 41 years.

Charles E. Higbee, one of the best known tunnel builders, was accidentally killed on August 12 at Shoshone, a camp of the Central Colorado Power Co., 12 miles east of Glenwood Springs, Colo. The accident was caused by the breaking of a derrick. He bored the Tennessee Pass tunnel for the Denver & Rio Grande, and the Raton tunnel for the Atchison, Topeka & Santa Fe, and has done notable work on many other tunnels.

Col. S. F. Gray, who until January 1, 1904, was Western Freight Agent of the Pennsylvania at Indianapolis, Ind., died on August 11 at Indianapolis, Ind. He was born in East Union, Ohio, on December 6, 1833. He began his railroad work in Findlay, Ohio, remaining there until his enlistment for the Civil War. On receiving his honorable discharge in 1866 he was appointed local agent of the Star Union Line, a property of the Pennsylvania. This position he held until promoted to Western Freight Agent.

Frank H. Reeves, Auditor of the Cleveland, Akron & Columbus and the Akron, Barberton & Belt, died on August 15. He was born February 15, 1872. After graduating from the Ohio State University in 1892, he was appointed supply clerk in the accounting department of the Cleveland, Akron & Columbus and has held the positions of clerk in the Auditor's office; Chief Clerk of the Accounting Department and Paymaster. In May, 1901, he was appointed Auditor, and in July, 1902, was made Auditor of the Akron, Barberton & Belt also.

# Railroad Construction.

### New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—An officer is quoted as saying that this company will have 370 miles of double-track in operation between Chicago and Kansas City, Mo., by December 25. The completion of the double track will give the Santa Fe a direct line from Chicago to Newton, Kan., via the Kansas City-Emporia cut-off.

AUGUSTA & EDGEFIELD (ELECTRIC).—Organized to build a line from Augusta, Ga., north via Edgefield, S. C., to Greenwood. It is said that the company is asking bids for surveying the route. W. P. Calhoun is Chairman; W. A. Strom and S. B. Mays are interested.

BRITISH COLUMBIA (ELECTRIC).—An officer writes that Messrs. Ironsides, Rannie & Campbell have been awarded the contract for the second section of the Chilliwac-Westminster line between Cloverdale, B. C., and Abbottsford, 26 miles. The contract price is approximately $190,000. Work is to be finished by June 1, 1909. The line will pass through the towns of Surrey, Delta, Langley and Matsqui. This line is being built by the Vancouver Power Co., Vancouver, B. C. (July 24, p. 600.)

CANADIAN ROADS.—The Canadian government has taken the initial step towards the construction of a railroad to Hudson Bay by sending out a survey party of 100 men from Winnipeg recently. The force will be divided into four parties and is to survey alternate routes via the Churchill and Nelson rivers. One party will go straight through to Fort Churchill and work eastward to the present terminus of the Canadian Northern at the Keewatin Pass. Another will follow the valley of the Nelson river to Port Nelson. An examination will be made of the harbor facilities both at Fort Churchill and Port Nelson. The choice of routes will depend upon the data secured as to the relative cost of construction, suitability of the country for settlement, etc. It is proposed to push the work as rapidly as possible so that the reports may be laid before Parliament early next year, when it is expected that legislation will be introduced authorizing the construction of the road. The total distance from the present terminus of the Canadian Northern to Fort Churchill is 498 miles.

CAROLINA, CLINCHFIELD & OHIO.—It is said that the line is now completed between Johnson City, Tenn., and Marion, N. C., about 100 miles, and that 212 miles will be completed by January. (Aug. 7, p. 692.)

CENTRAL TEXAS TRACTION.—Incorporated in Delaware with $300,000 capital to build a line from Corsicana, Tex., southeast to Palestine, 60 miles. W. W. Clopton, J. V. Watkins, of Corsicana; Dr. J. O. Howard, of Houston and H. W. Davis and G. A. Duren are interested.

CHICAGO & MILWAUKEE (ELECTRIC).—It is said that this company is completing its Chicago-Milwaukee line and will be running cars into Milwaukee by September 1. (R. R. G., April 10, p. 524.)

CINCINNATI, KENTUCKY & VIRGINIA.—Surveys are being made and rights of way secured for this proposed line. Surveys have been finished on about 50 miles. The projected route is along the Licking river valley, traversing timber and coal lands of eastern Kentucky. The plans call for building about 275 miles of railroad. It has not yet been decided when bids for the construction work will be asked for. Some of the capital to carry out the work has been secured. T. C. Bayland, Vice-President, 211 Railway Exchange, Chicago, Ill.

COLORADO SOUTHERN, NEW ORLEANS & PACIFIC.—A press report from Baton Rouge, La., says that work on the line from Beaumont, Tex., to Baton Rouge has been resumed.

COOS BAY RAILWAY & TERMINAL CO.—Incorporated in Tacoma, Wash., with a capital stock of $250,000, to build a single or double track line from a point near the center of Section 8, Township 26, Range 14, in Oregon, west, through the towns of Empire, Ore., North Bend and Marshfield, to a point near the center of Section 14, Township 26, Range 13, west. The incorporators are Henry Hewitt, Jr., J. J. Hewitt and Seymour H. Bell.

FERDINAND RAILROAD.—Organized at Jasper, Ind., with a capital stock of $150,000, to build a line from Ferdinand, Ind., to Huntingburg, seven miles. It is announced that the road is to be completed by next year.

FLORIDA EAST COAST.—Officials of this company are quoted as saying that the extension work will be finished and the road in operation to Key West within 15 months.

FORT WORTH, MCKINNEY & BONHAM.—Organized by residents of McKinney, Tex., to build a line to connect Fort Worth, McKinney and Bonham. Surveys are soon to be made. The incorporators include S. A. Scott, J. S. Heard, S. D. Heard, F. B. Pope, J. P. Crouch.

GAINESVILLE, WHITESBORO & SHERMAN INTERURBAN.—Building an electric line from Gainesville, Tex., east to Sherman, 39 miles. Grading, it is said, has been finished on 12 miles, and track laying is soon to be started. J. King, President; L. M. McArthur, Chief Engineer, Gainesville.

GEORGIA & FLORIDA.—Track laying is reported under way and about five miles finished from Nashville, Ga., south between Nashville and Valdosta; also on five miles from Valdosta north. The work on this 30 miles is being carried out to connect existing lines. The complete line is to form part of a through line from Augusta, Ga., south to Madison, Fla. (R. R. G., May 8, p. 655.)

GRAND TRUNK PACIFIC.—Collingwood Schreiber, Consulting Engineer, has received information that the line is finished 675 miles west of Winnipeg as far as Battle river, where it is awaiting the completion of the big bridge. Between this point and the Clover Bar bridge the distance is 112 miles. The substructure on each bridge is finished, and the superstructure in progress. It is expected that track will be laid to Edmonton by November 15. West of Edmonton 2,000 men are working on the Edmonton-Wolf river section of 119 miles, and it is anticipated that the first 70 miles of this section will be finished this year. The contract for 70 miles of the 100-mile section east from Prince Rupert has been sublet to contractors, who are pushing the work.

ILLINOIS CENTRAL.—After three years of work, the extension from Zeigler, Ill., to Herrin, has been opened to traffic. Hereafter the bulk of the coal traffic from this district will be sent to Chicago and St. Louis, Mo., by way of Duquoin, Ill., which will thus become an important distributing point. Freight hauling facilities are to be increased, involving an expenditure of about $30,000, and a passenger schedule will be established in a few months.

Officials of the Yazoo & Mississippi Valley reported the resumption of construction and improvement work north of Baton Rouge, La., and in Mississippi.

IDAHO & WASHINGTON NORTHERN.—Construction work, it is said, is to be started soon on the extension of this road from Newport, Wash., north along the Pend O'Reille river to Metaline, 75 miles. A further extension north may also be built to connect with the Canadian Pacific at some point in British Columbia. (July 3, p. 457.)

INDIANAPOLIS, NEWCASTLE & TOLEDO (ELECTRIC).—This company was incorporated in 1904 to build from Indianapolis, Ind., to Newcastle, 46 miles; Newcastle to Muncie, 20 miles; Newcastle to Winchester, 28 miles; Newcastle to Richmond, 26 miles, and Shirley to Anderson, 16 miles. Work was started some time ago on the section from Indianapolis to Newcastle and Richmond. The line is not yet in operation. The Union Trust Co., Indianapolis, is Receiver of the property, and bids were asked Aug. 20 for the completion of the line.

INTERCOLONIAL RAILWAY.—The Department of Railways is making surveys for the proposed double-tracking this road from Painsec Junction, N. B., to Truro, N. S., 116 miles. An alternative route over the Cobequid mountains will be surveyed, which may be adopted for a new line instead of double-tracking the present one.

MADISON SOUTHERN.—It is reported that this company has commenced work on its line from Madison, Fla., to the Gulf.

MEMPHIS, PARIS & GULF.—The Arkansas State Board of Railway recently granted this company permission to extend its road from the present northern terminus at Nashville, Ark., northeast through Hempstead county to Murfreesboro, Pike county, 15 miles. The new line will connect with the Prescott & Northwestern at Tokio. (R. R. G., Feb. 28, p. 297.)

MEXICAN ROADS.—A syndicate is making surveys for a railroad from the San Carlos mines via Sierra Rico to some point on the Kansas City, Mexico & Orient. Another survey will be made to the Southern Pacific in Texas, and another to Ferrocarril del Norte, in Coahuila. Dr. C. F. Z. Caracristi, of Chihuahua, Chi., is interested.

It is said that the Mexican Government is contemplating the construction of a road along the frontier, or it is prepared to grant a liberal concession to any responsible private corporation that will undertake the work. It is especially desirous of having that part of the border between Nuevo Laredo, state of Tamaulipos, and Las Vacas furnished with railroad facilities. The proposed line would be about 200 miles long. No engineering or construction difficulties, it is said, exist in connection with the building of the road, and every facility will be furnished by the government to any responsible company undertaking the work. It is said that such company will be allowed to import rails and other material free of duty and that the government is prepared to give a large subsidy to assist in building the line. The outlined plans contemplate the line down the Rio Grande river from Nuevo Laredo to a connection with the National Railroad of Mexico at Matauoros, Tamaulipos.

MILWAUKEE LIGHT, HEAT & TRACTION CO.—This company has opened its Milwaukee-Watertown line, about 49 miles. It also intends to build a line from Watertown, Wis., via Beaver Dam to Fond du Lac; also to Janesville, via Jefferson, and also to Madison. (July 17, p. 555.)

MISSOURI & KANSAS INTERURBAN.—The Arnold Co., Chicago, which has the contract for the design and construction of the equipment necessary in the electrification of the line from Kansas City, Mo., to Olathe, has completed all the general features of design and the detailed design work. It is intended to have the road in operation on or before November 1.

NASHVILLE & HUNTSVILLE.—I. L. McCord, of Huntsville, Ala., will within the next few days let contracts for additional grading and construction work. (Aug. 7, p. 693.)

NEW YORK, NEW HAVEN & HARTFORD.—See this company under Railroad Financial News.

NORTH JERSEY RAPID TRANSIT.—Organized in New Jersey, with $2,000,000 captal stock, to build an electric line from Suffern, N. Y., south to Paterson, N. J., about 16 miles. W. A. Barbour, President; M. R. McAdoo, Vice-President, and H. H. Palmerlee, Secretary and Treasurer.

PENNSYLVANIA.—That portion of the line extending from a point on the Yukon branch, one-half mile west of Hunker passenger station, on the South West branch, to a point 0.66 of a mile west of the center of the proposed site for the station at Yukon, Westmoreland county, Pa., 4.52 miles, has been completed, and will, on and after August 15, be operated as a part of the Yukon branch, Pittsburgh division.

PHILADELPHIA & READING.—Bids are wanted September 16 by W. Hunter, Chief Engineer, Philadelphia, Pa., for work in connection with the abolishment of grade crossings on the Philadelphia, Germantown & Norristown as follows:

Contract No. 21.—Locomotive coaling station, Green street yard.

Contract No. 31.—Coal pocket yard at northeast corner of Tenth and Norris streets.

Contract No. 32.—Masonry, embankment, paving, water and drainage systems and new freight office building in yard between Berks and Norris streets, west side.

Contract No. 35.—Drainage for yards between York street and Cumberland street. (R. R. G., Feb. 14, p. 233.)

PITTSBURGH, BINGHAMTON & EASTERN.—It is said that this company has let a contract for an additional 100 miles of the line to Oliver & Co., Knoxville, Tenn.

Reports of the Chief Engineer, it is said, show that grading has been completed and about 4½ miles of track laid on the extension from Cedarledge, Pa., northeast to Powell, about 21 miles. North from Clearfield, Pa., the road will be about 225 miles long, and will pass through Lock Haven, Pa., Williamsport, Canton, Towanda, Sayer and Oswego, N. Y. An extension will be built from Powell northeast to Binghamton, about 60 miles. (Aug. 7, p. 693.)

POTOMAC VALLEY.—Construction work, it is said, is to be started soon on this proposed line at Keyser, W. Va. The company has franchises in Keyser and Piedmont and also from Keyser west to Bloomington, Md. Ties and rails, it is said, have been ordered. A. G. Fickelsen is interested, and L. S. Kirker is Chief Engineer.

RIO GRANDE, SIERRA MADRE & PACIFIC.—A press report from the City of Mexico says that an application will soon be made to the government for the transfer of the concession now held by Col. W. C. Greene to E. H. Harriman and associates. This concession is for building an extension of the R. G., S. M. & P. line across the Sierra Madre mountains, to a connection with the Cananea, Yaqui River & Pacific at or near Tonicine, Sonora. The estimated cost of the extension is $5,000,000. (June 26, p. 409.)

ST. LOUIS & OKLAHOMA SOUTHERN.—Organized to build a line from Joplin, Mo., southwest to Muskogee, Okla., about 120 miles. Grading, it is said, is now under way, and has been finished from Joplin, Mo., to Tahlequah, Okla., 90 miles. J. W. Christensen, President; E. A. Peters, Vice-President, St. Louis, Mo.

SALT LAKE & OGDEN (ELECTRIC).—Regular passenger trains, it is said, are now running between Salt Lake City, Utah, and Ogden. (Aug. 7, p. 694.)

SANFORD & EVERGLADES.—Organized in Florida to build about 250 miles of railroad from Sanford, Fla., south through Orange, Osceola, Brevard, St. Lucie, DeSoto and Dade counties, to Lake Okeechobee. The company may also operate a line of steamers. A. T. Rossiter, President, Sanford.

SOUTHERN.—Announcement has been made that this company will resume the work of improvements on its line from Stevenville, Ala., to Chattanooga, Tenn., which was suspended several months ago. (R. R. G., April 19, p. 566.)

SOUTHERN PACIFIC.—The Texas & New Orleans, it is said, will begin building early in September the new short line from Gallatin, Tex., on its main line, south to Rusk, nine miles. Most of the right of way has been secured. It is expected that the line will be finished by February. (July 31, p. 647.)

The Utah Construction Co. has been given the contract for grading the roadbed for double track between Colfax, Cal., and Copper Gap, 20 miles. The work includes the boring of a tunnel to avoid the Cape Horn curve, and involves an expenditure of approximately $2,000,000.

SPARKS WESTERN.—Organized to build a line from Sparks, Ga., west 10 miles to a connection with the Atlanta, Birmingham & Atlantic. Contracts reported let to J. R. Garfield, of Unadilla, Ga., and to R. L. Wilson, of Cordele, Ga. It is expected to have the line built and equipped this year. The Mayor of Sparks may be addressed.

TAMPA NORTHERN.—This road, now in operation from Tampa, Fla., north to Brooksville, 49½ miles, proposes to build at once an extension north from Brooksville to Dunnellon, 35 miles, and on completion of this work a further extension north 150 miles to Thomasville, Ga. (R. R. G., March 13, p. 395.)

TEXAS & NEW ORLEANS.—See Southern Pacific.

TEXAS ROADS.—A syndicate, it is said, has been formed to build a line from Glenrose, Somervell county, Tex., northeast to Cleburne, 20 miles. A trip over the proposed route was recently made by Mayor Smith, of Mineral Wells, and a number of business men of Cleburne who are interested.

Work, it is said, will be started in September on a line from Brownsville, Tex., northwest through the lower end of Hidalgo county. It is eventually intended to build an extension from Brownsville north to San Antonio, 250 miles. Surveys have been made for the first 25 miles, and contracts let to Sam Robinson, of Brownsville, for 15 miles. Judge D. V. Chapin is now in San Antonio representing the company. R. F. Scott, J. C. Gihons, S. Braden, R. Speas, A. G. Hubbard and J. Closner, all of Hidalgo, and J. M. Johnson, of Mercedes, are interested.

Surveyors are locating a new line from Brownsville, Tex., to Hidalgo, which is later to be extended to San Antonio. It is stated the Gulf Coast Construction Co. has the contract for grading the first 15 miles. R. F. Scott, President of the First National Bank at Paris, Tex., is interested.

UNION PACIFIC.—Double tracking the main line between Green River, Wyo., and Granger, 30 miles, it is said, is to be pushed to completion. Along the main line there are a number of side tracks. The principal work will be connecting up these side tracks for the second track.

VIRGINIA ROADS.—Surveys have been made for a line to be operated by gasolene electric motor cars from Westpoint, Va., northeast to Urbana, 25 miles. Plans include a branch south 35 miles on the peninsula between the York and Rappahannock rivers, to New Point Comfort. J. C. Robertson and C. P. E. Burgwyn, of Richmond, are interested.

WACO, HAMILTON & BROWNWOOD.—Preliminary surveys reported made, but right of way and capital are not yet obtained for this proposed line. The projected route is from Waco, Tex., west to Brownwood, 132 miles. J. B. Baker, President; Steven Turner, Chief Engineer, Waco. (R. R. G., Oct. 25, p. 510.)

# Railroad Financial News.

BUFFALO, ROCHESTER & PITTSBURGH.—A dividend of 2 per cent. has been declared on the common stock. In February, 1908, and August, 1907, 2½ per cent. was paid on the common stock. From 1904 to 1906 inclusive the annual rate was 6 per cent. The regular 3 per cent. semi-annual dividend has been declared on the preferred stock.

CAROLINA, CLINCHFIELD & OHIO.—Blair & Co., New York, have underwritten $10,000,000 30-year, 5 per cent. first mortgage bonds of the Carolina, Clinchfield & Ohio. (See this road under Railroad Construction.)

CENTRAL OF GEORGIA.—The interest on all classes of income bonds was passed by the directors on August 14. There is a suit pending, brought by the holders of the income bonds against the company to compel it to show cause why interest has not been paid on the income bonds.

CHICAGO CONSOLIDATED TRACTION.—The *Chicago Economist* of August 8 says:

"Judge Grosscup has ordered the August interest paid on the underlying bonds instead of ordering the paving and relaying of tracks, required by the ordinance. The tracks are in bad condition, but no definite action has yet been mapped out for securing funds."

CHICAGO, ROCK ISLAND & PACIFIC.—As provided for in the agreement for the extension of the $6,000,000 collateral coupon notes (Speyer & Co.), new 5 per cent. first mortgage bonds of the Rock Island, Arkansas & Louisiana are to be substituted, dollar for dollar, for the 4 per cent. bonds now pledged as security for the notes, effective Sept. 1. The Rock Island, Arkansas & Louisiana, 308 miles long, and now completed, connects the northern Rock Island lines with the Colorado, Southern New Orleans & Pacific, which is now building from Baton Rouge, La., to Opelousas, 59 miles, and is in operation from Opelousas to Houston, Tex., 219 miles. Trackage rights are to be furnished into New Orleans from Baton Rouge over the Illinois Central, and the Rock Island lines will thus obtain a north-and-south route into New Orleans, of which the Rock Island, Arkansas & Louisiana is an integral part.

GRAND TRUNK.—The question of dividends on the first, second and third preferred stock for the half year ended June 30, has been deferred until the results of operation for the year ending December 31, 1908, have been determined.

ERIE.—J. P. Morgan & Co. are to buy the interest coupons on the following bonds of the Erie, in accordance with their plan of June 11:

| | Bonds outstanding. |
|---|---|
| New York & Erie, second mortgage, 5 per cent. | $2,149,000 |
| New York & Erie, third mortgage, 4½ per cent. | 4,617,000 |
| Erie Ry. Co., first consolidated mortgage, 7 per cent. | 16,891,000 |
| New York, Lake Erie & Western, first consolidated mortgage, 7 per cent. | 3,699,500 |
| New York, Penn. & Ohio, prior lien, 4½ per cent. | 8,000,000 |

The coupons due July 1, August 1 and September 1, and those due January 1, 1909, aggregate $4,898,755. This amount represents a loan of J. P. Morgan & Co. to the Erie.

LONDON UNDERGROUND ELECTRIC.—The coupons due July 1, representing seven months' interest on the new 4½ per cent. bonds of 1933, are being paid by the company to holders of the profit sharing secured notes or receipts for notes.

LOS ANGELES & REDONDO.—This company has increased its authorized issue of capital stock from $1,000,000 to $5,000,000. There is now outstanding $500,000 stock.

MEXICAN CENTRAL.—The managers of the syndicate, which in 1906 underwrote $33,000,000 four-year, 5 per cent. collateral trust notes and about $6,000,000 prior lien 4½ per cent. bonds, have requested members to consent to an extension of the syndicate until December 20. The syndicate will expire by limitation on September 1 if no action is taken.

MUNICIPAL TRACTION.—On August 13 the company began charging 5 cents for each passenger who pays a cash fare. Tickets are sold in amounts of not less than five at 3 cents each. This is done, it is said, to save the conductors' time in making change.

NEW YORK CENTRAL & HUDSON RIVER.—The corporation tax on the gross earnings falling due on August 1 has been paid. This probably shows that the New York Central finds it cheaper to borrow money than to pay the penalty which the state imposes for each week the tax is left unpaid.

NEW YORK CITY RAILWAY.—In a statement of results of the operation from September 25, 1907, to June 30, 1908, filed yesterday with Judge Lacombe, in the United States Circuit Court, by Adrian H. Joline and Douglas Robinson, Receivers until August 1, it was shown that the traction corporation, the lessee of the Metropolitan Street Railway, incurred an aggregate deficit in that period of nine months and six days of $6,112,679.

The following is the financial statement for the period from September 25, 1907, to June 30, 1908:

| | | |
|---|---|---|
| Gross earnings: Cash fares | | $11,497,007 |
| Ticket fares | | 28,437 |
| Mail | | 819 |
| Express | | 20,883 |
| Total | | $11,547,146 |
| Operating expenses: | | |
| Maintenance of way and structures | $929,012 | |
| Maintenance of equipment | 1,912,254 | |
| Operation of power plant | 899,432 | |
| Operation of cars | 3,639,087 | |
| Injuries and damages (expended) | 489,713 | |
| Injuries and damages (deferred) | 686,264 | |
| General | 708,076 | |
| | | 9,263,338 |
| Net earnings | | $2,283,308 |
| Other income: | | |
| Advertising | $178,108 | |
| Rental of land and buildings | 109,092 | |
| Rental of tracks | 11,110 | |
| Rental of equipment | 8,712 | |
| Miscellaneous interest | 222,017 | |
| Other income | 4,744 | |
| | | 533,783 |
| Gross income | | $2,817,091 |
| Deductions from income: | | |
| Taxes, other than special franchise | $607,424 | |
| Taxes, special franchise | 599,813 | |
| Rent leased lines not permanently defaulted | 2,156,727 | |
| Interest on funded debts of roads operated under agreement | 79,083 | |
| Interest on real estate mortgage | 36,417 | |
| Interest on floating debt | 2,115 | |
| Claims against companies in hands of receivers | 383,197 | |
| | | $3,864,774 |
| Net income—deficit, not inc'dg. charges defaulted | | $1,047,683 |

To this apparent deficit of $1,047,682 must be added expenditures, incident to the operation of the property, aggregating $344,883, over which question has arisen as to whether they shall be charged to the capital or operating account, and default on rentals of lines operated under leases and agreement aggregating $4,720,114, making a total deficit for the period indicated of $6,112,679. In offering the briefest comment on the report Oren Root, General Manager of the company, said:

"It is true that operating expenses, normally, should average about 65 per cent. of the gross income. They were increased in this instance by reason of the run down condition of equipment. Last winter, too, much trouble was encountered with the trolley slots. In addition to the expenditures listed an additional item of $943,874 was paid out for equipment purposes, this being met chiefly from receivers' certificates, which were issued to the amount of $3,500,000.

"As much has been said about over-capitalization and huge earnings, I want to point out that the state and municipal assessing authorities have valued the properties involved in the statement at $92,000,000. I have nothing to say as to the correctness of that total. But, after wiping out all charges to underlying companies, it is found that only $800,000 was left of income, or a return of about 1 per cent. on that valuation. Now, if a fair return of 5 per cent. was to have been obtained the total margin should have been about five times that amount."

NEW YORK, NEW HAVEN & HARTFORD.—The purchase of the New York & Portchester and the New York, Westchester & Boston projects cost the New Haven, President Mellen says, $11,000,000. It is proposed to build as soon as conditions are favorable.

PHILADELPHIA, BALTIMORE & WASHINGTON.—The District Supreme Court on August 10 required the Secretary of the Treasury of the United States to pay $1,500,000 to the Philadelphia, Baltimore & Washington toward the cost of the Union station at Washington, D. C. This money had been held up by the Interstate Commerce Commission. (July 31, p. 648.)

PHILIPPINE RAILWAY.—An additional $290,000 first mortgage 4 per cent. bonds have been issued. The interest on these bonds is guaranteed by the Philippine Government. There were on July 25, $3,770,000 of these bonds outstanding.

ROCK ISLAND, ARKANSAS & LOUISIANA.—See Chicago, Rock Island & Pacific.

ST. LOUIS & SAN FRANCISCO.—Hallgarten & Co. have agreed to extend for six months the unpaid balance of the loan of $300,000 to the St. Louis & San Francisco. This loan would have matured this month.

SANTA CLARA & INTERURBAN.—All the rights and franchises of the Santa Clara & Interurban, which was organized to build a network of electric lines in the suburban district of San Francisco, Cal., have been purchased by the Southern Pacific. Owing to the financial depression the electric line could not raise funds to finance the project.

SEABOARD AIR LINE.—Receivers' certificates to the amount of $3,000,000 have been presented at the United States Circuit Court for the eastern district of Virginia for final execution.

SOUTHERN INDIANA.—Default having been made on the interest due on August 1 on the Southern Indiana first mortgage 4 per cent. 50-year bonds, the two following protective committees have been organized:

(1) George W. Young, Chairman; R. R. Govin, G. L. Stone, A. Merritt Taylor, W. W. Gurley, Gordon D. Bruce, Secretary, 59 Cedar street, New York.

(2) A. G. Hodenpyl, Chairman; John F. Thompson, R. H. Higgins, A. C. Raymond, Seth M. Carter, J. W. Hammer, John C. Weadock, Secretary, 7 Wall street, New York.

UNION PACIFIC.—The suit brought by the estate of Charles Durkee for $27,299,000 has been dismissed. (July 24, p. 602.)

WABASH-PITTSBURGH TERMINAL.—The Protective Committee, J. W. Wallace, Chairman, has instructed the Mercantile Trust Co., Trustee of the $50,000,000 first mortgage bonds, to begin foreclosure proceedings. There are outstanding under this mortgage $30,236,000 bonds.